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BOOK REVIEWS

Adelges Insects of Silver Firs, by I. W. Varty, 1956. (iv) and 75 pp., 70 plates, 32 tables, text-figures. Forestry Commission Bulletin No. 26.

This is a very useful summary of the status of the two species of Adelges (Dreyfusia) which attack spruce and silver firs. The works of Schneider-Orelli (1945, 1950) and of Börner (1932, in 'Sorauer'; and 1952 'Europae Centralis Aphides'—the latter not mentioned in references) are not readily available.

The sixteen pages of plates include excellent photomicrographs of cleared and mounted insects, also photographs of living insects and of damaged trees.

A number of small points deserve attention. The two proximal veins in the forewing are usually taken to be the first and second cubitals, not cubital and anal. The distribution of wax-glands, as of other structures in the Aphidoidea, may be referred to three primary pairs of longitudinal rows and two secondary pairs, these being usually designated as spinal, pleural and lateral, with spino-pleural and pleuro-lateral occasionally added. Structures are also sometimes present on the ventral surface, so the term 'mesial' is not suitable. The larval eye consists of three facets, and may be called a 'triommatidion'; true

ocelli are absent from Adelgids, but occur in alate forms of some aphids.

In the systematic description, measurements are based on 4 or 5 specimens in many cases, in others on 10 to 20. Larger samples would be desirable, but some forms are difficult to obtain.

A distinction should be made between male-producing winged forms (androparae) and female-producing (gynoparae) in the sexual generation. In Adelgidae these both belong to the same generation, and this affords an important distinction from certain Aphididae, since in the latter it is often the case that only the gynoparae are winged, the androparae being wingless. Since in such an event the males will be winged, whilst the oviparous females (sexuales) will be wingless, it follows that the oviparae will occur one generation later than the androparae. In cases where apterous males occur, the males and oviparae will develop from quite different lines of descent, so as to bring them together on the primary host-plant; often the species is monophagous.

In referring to attacks by insects, 'infestation' is a better term than 'infection'.

'Extrapolation' from clover aphids to Adelgids is not permissible, particularly with regard to physiological characters. Consideration of the species of *Capitophorus* inhabiting the undersides of thistle leaves, or of *Ovatus inulae* Walk. and *Aphis verbasci* Schr. will make it obvious that hairiness in plants has no bearing on their liability to attack.

The work concludes with a section on Forest Relations of Adelgids from the practical standpoint.

The use of chromatography as an aid to determination of species might be linked to the work of Todd et al. (in J. chem. Soc.) on the pigments of *Tuberolachnus saligna* Gmel., *Aphis fabae* Scop. and other aphids. C. S. WOOD-BAKER

A Textbook of Entomology by Herbert H. Ross. Second edn., 1956. pp. 519. Illust. Cloth. Wiley, New York. Price £3 2s. Distributed in G.B. by Chapman and Hall.

This book was first published in 1948 and is not so well known in this country as it deserves to be. The field it covers is unusually broad, and although it concerns itself to a certain extent, and very naturally, with American Entomology, it is also a very sound concise class textbook.

Modern advances are well reflected in this second edition, which contains a great deal of information on recent work on insect physiology.

The chapter 'The Orders of Insects' is just over 200 pages and contains excellent Keys and very clear illustrations; it will be found extremely useful to students. The whole volume is very well illustrated and can be confidently recommended. E.W.C.

A SUPPLEMENTARY NOTE ON *SPAELOTIS RAVIDA* (SCHIFFERMUELLER) (THE STOUT DART) IN BRITAIN (LEP: CARADRINIDAE)

By R. F. BRETHERTON, C.B., M.A., F.R.E.S.

Since my previous paper on *Spaelotis ravida* (1957 *Ent. Gaz.*, **8**(1): 3-19) was written, much further information about its occurrence in Britain has been communicated, either directly to me or to the Editor, by collectors who have had personal experience of it. These valuable fresh records are summarized below in the same form as those given in the original paper, to which they can be conveniently be added. They fill a number of gaps in the years for which the species has been recorded; indeed, from 1930 to 1956 records of some kind are now lacking only for 1931, 1933 and 1937, and it is clear that in the present decade it has been much less rare than had been previously thought. It seems to have had a particularly good year in 1956, for which there are accounts of it in eleven localities, spread over six counties. They also show up some unsuspected areas of distribution for it in recent years, notably near Chesterfield (Derbyshire), Wellingborough (Northants), and Winchester (Hants), in all of which it has clearly been established for several successive years. There is also confirmation of permanent residence in some other places, such as the Peterborough district, though in some others, such as Reading and Cambridge, the experience of regular collectors shows that its appearance is casual or erratic only.

Thus at Hepthorne Lane, near Chesterfield, Mr. J. H. Johnson found one *Spaelotis ravida* in his light trap in 1953, five in 1954, and four more in 1955: his trap was not operated in 1956. At Wellingborough, Mr. P. Gent has obtained it in his mercury vapour trap in all six seasons from 1951 to 1956, but only in small numbers except in 1955, when there were thirty-two! At Martyr Worthy, near Winchester, Mr. D. W. H. ffennell found specimens either in the house or at car lights in 1945, 1946 and 1947, and recollects that he took the species more frequently there before the war. For the Peterborough district Mr. S. Pooles provides definite records for a number of years between 1932 and 1956, and adds that he has always looked upon the species as common, though more in some years than in others. He has taken it in a number of houses and gardens in Peterborough City, as well as in woods and fens near by, and he relates that on one occasion, after pulling out a chunk of rotten wood from a hollow willow tree, he found at least a dozen *S. ravida* underneath, which scuttled away in a manner very like that of *Amphipyra tragopoginis* (L.).

These are all cases which indicate regular residence in the areas concerned. But for the Reading district of Berkshire, Mr. Rudland, after providing records of a single specimen at Long Wittenham in 1930 and two at Caversham in 1934, says that, though he collected intensively in the district from 1926 to 1953, neither he nor his fellow collectors saw any others (though in fact some were found at Cold Ash in 1935 and Tilehurst in 1943). In Cambridge also, though one was taken in a college room in 1945, Mr. B. O. C. Gardiner states that he has seen nothing of the species in the last ten years, though he and another collector have worked regularly with mercury vapour light: 'if it still occurs at all, it is of exceedingly rarity'. Finally, in the Essex marshes, where the Reverend C. R. N. Burrows took *S. ravida* so regularly at the beginning of the century, Mr. H. C. Huggins sums up its status in recent times as 'periodic, never common, often absent for several years, probably an occasional settler from migrations': he saw five at sugar in 1950, including a magnificent, crimson-flushed aberration, and in 1955 he had a worn one in his mercury vapour trap at Westcliff, and he also records two taken in the same way by Mr. D. M. More at Hockley.

The general tendency of these and other fresh records is to support the view that *S. ravida* is a permanent but 'unhappy' resident in Britain, widely distributed but generally rare and only attracting attention in occasional periods of relative abundance. On the whole I do not think that immigration from abroad has much, if anything, to do with its presence or numbers here, though admittedly this is a negative which by its very nature can hardly be proved. Unfortunately, no new light has yet been thrown on the habits of the species in its early stages: the elucidation of these remains as a tempting piece of research for someone who lives in one of its present haunts.

ADDITIONAL DATED EVIDENCE OF *SPAELOTIS RAVIDA* (SCHIFF.) IN BRITAIN

(Records contributed *in litt.* unless otherwise stated.)

1896 LINCS: Panton (Raynor, now in J. P. Robson coll.).
1901 ESSEX: Mucking, two vii, one viii (Burrows, now in Robson coll.).
1902 EAST YORKS: One viii (S. Walker, now in Robson coll.).
1906 ESSEX: Stanford-le-Hope, two worn at sugar viii (H. C. Huggins).
1907 LINCS: Haverholme, two viii (Coward, now in H. C. Huggins coll.).
1908 DURHAM: Hart, three vii (J. Gardner, now in Robson coll.).
1911 LINCS: Sleaford, one (Coward, now in H. C. Huggins coll.).
*1913 CAMBS: Wicken, three at sugar early vii (H. C. Huggins).
*1930 BERKS: Long Wittenham, one female at sugar 26.viii (W. L. Rudland).

*1932 NORTHANTS: Castor Hanglands, two 15 & 19.vii (S. Pooles).
*1934 NORTHANTS: Bedford purlieus, two 26 & 30.vii (S.P.); BERKS: Reading, two females 4 & 7.viii at sugar (W.L.R.); HANTS: Headley, one at sugar, ix (C. I. Rutherford).
1935 NORTHANTS: Peterborough City, three 4.vii, two 8.vii (S.P.); CAMBS: Wicken Fen, one or two at sugar 11/14.vii (G. A. Ford), two 25.vii (S.P.); BERKS: Cold Ash, three 11/12.vii (C. Rippon, now in Newbury Mus. coll.).
1936 NORTHANTS: Peterborough City, one 8.viii (S.P.); BUCKS: Gerrard's Cross, one at buddleia blossom 11.viii (G.A.F.).
1943 BERKS: Tilehurst, one at sugar vii (Dr. L. H. Williams, per Sir Robert Saundby).
1945 CAMBS: Cambridge, one in a curtain 16.vii (D. P. Ransom); Balsham, one in house, two at electric light 22.vi, 3.vii, 4.viii (G.A.F.); BUCKS: Great Kingshill, one in lighted room 16.vii (Sir Robert Saundby); HANTS: Martyr Worthy, one male and one female in house 28.vi (D. W. H. ffennell).
1946 CAMBS: Balsham, two at electric light 23.vii, 25.viii (G.A.F.); HANTS: Winchester, one male at car lights 28.vi (D.W.H.ff.).
1947 NORTHANTS: Peterborough City, vii (S.P.); HANTS: Martyr Worthy, one female in house 28.vi (D.W.H.ff.).
1949 EAST YORKS: Spurn, fairly common viii (*Entomology of the Spurn Peninsula*).
*1950 SOUTH ESSEX: Marshes, five at sugar 26/28.vi, one 26.viii (H.C.H.).
*1951 NORTHANTS: Wellingborough, two at m.v. light viii (P. Gent).
*1952 NORTHANTS: Wellingborough, three vii/viii (P.G.).
1953 DERBY: Hepthorne Lane, one at m.v. light vii (J. H. Johnson); NORTHANTS: Wellingborough, two viii (P.G.).
1954 DERBY: Hepthorne Lane, five at m.v. light 13 & 17.vii, 26 & 29.viii (J.H.J.); NORTHANTS: Wellingborough, thirty-two vii, viii, ix (P.G.); OXON: Northmoor, one male at m.v. 28.viii (D.W.H.ff.).
1955 DERBY: Hepthorne Lane, four at m.v. 8 & 15 vii, 2 & 5.viii (J.H.J.); NORTHANTS: Wellingborough, four at m.v. viii (P.G.); HUNTS: Holme Fen, one in a shed viii (B. West, per B. O. C. Gardiner); ESSEX: Westcliff, one worn at m.v. 31.viii (H.C.H.).
*1956 LINCS: Skegness, one at m.v. 24.vii (W. Reid); Boston, several in m.v. trap 24.vii/24.viii (Pilcher, per W.R.); NORTHANTS: Peterborough City, at least eight 27 & 28.vii, viii (S.P.); Castor Hanglands, two 5.vii (S.P.); Wellingborough, three vii (P.G.); HUNTS: Holme Fen, one 15.vii (S.P.), Monks Wood, two 1.viii (B.O.C.G.); NORFOLK: Thetford, one at m.v. viii (C. Rivers, per B.O.C.G.); ESSEX: Hockley, two in m.v. trap viii (D. More, per H.C.H.); Takeley, one under a sack, 12.viii (S.P.); MIDDLESEX:

Totteridge, two early viii, one female 21.ix (R. G. Lorimer).

Years for which no records were included in the earlier article are marked with a *.

My thanks are due to the gentlemen concerned for the trouble which they have taken in supplying the above records and accounts of the circumstances in which they were made.

Ottershaw Cottage,
Ottershaw, Surrey.
April, 1956.

BOOK REVIEW

A General Textbook of Entomology, by A. D. Imms, 1957. Ninth Edition, revised by O. W. Richards and R. G. Davies. Pp. 876, with 609 illustrations. Methuen & Co. Ltd., London. Price £3 15s.

First published in 1925, the last full revision of this deservedly popular textbook was in 1934. This ninth and latest edition has been fully revised to include the more recent researches in all fields of Entomology, and in consequence the whole work has expanded by about a quarter.

All the physiological sections have been rewritten, 29 orders now being recognized. The Diplura, formerly united with the Thysanura, are treated as a separate order, whilst the Grylloblattodea, Phasmida and Dictyoptera are recognized as separate orders, having been extracted from the Orthoptera. Other new orders include the Zoraptera, formerly treated as a sub-order of the Psocoptera, and the Siphunculata and Mallophaga, previously regarded as sub-orders of the Anoplura.

Fifty new illustrations have been included, also new and revised keys for the identification down to family level. The literature has been considerably expanded and brought up to date. This comprehensive and very clearly illustrated work is one which must (and no doubt will) be on the shelf of every library and biological institution.

A.E.G.

ANACRIDIUM AEGYPTIUM (L.) IN FELTHAM (SALTATORIA: ACRIDIDAE)

A live female *Anacridium aegyptium* was obtained by Mr. E. W. Classey from a fruit shop at Feltham, Middlesex, during the early part of February, 1957. A few weeks previously a specimen of the Australian Cockroach, *Periplaneta australasiae* (F.) was taken from the same premises. I am indebted to Mr. Classey for both specimens.

A. E. GARDNER.
29 Glenfield Road,
Banstead, Surrey.

NOTES ON SOME BRITISH SPECIES OF THE GENUS *HYDROPSYCHE* (TRICHOPTERA)

By D. E. KIMMINS
Department of Entomology, British Museum (Nat. Hist.).

This paper originated in an attempt to find characters whereby the females of our species of *Hydropsyche* might be separated. To it has been added the results of an investigation of the males of certain species allied to *H. guttata* Pictet, in consequence of which it is proposed to restore *Hydropsyche contubernalis* McLachlan to the British list in place of *H. ornatula* auct., *nec* McLachlan.

H. guttata Pictet and *H. ornatula* auct. were for long confused in British and Continental collections, even McLachlan himself having many examples of *ornatula* determined as *guttata* in his collection. Mosely distinguished the two species in his Handbook under the names *guttata* Pictet and *ornatula* McLachlan. Some time ago I had occasion to make a preparation of the genitalia of a ♂ cotype of *guttata* Pictet in the British Museum (Nat. Hist.) and found difficulty in reconciling it with the figure given by McLachlan from the pinned ♂ cotype in the Leiden Museum. (McLachlan had, I believe, studied Pictet's collection, but he makes no reference to having seen in it any cotype of this species, and one presumes that it was then no longer in existence). I therefore wrote to Leiden for information about the cotype which McLachlan figured and the authorities there very kindly lent me the specimen, with permission to make a preparation of the genitalia. I should like here to express my grateful thanks to the Director, Dr. H. Boschma, and also to Dr. M. A. Lieftinck for their assistance in my investigation.

Hydropsyche guttata Pictet (Fig. 1)

Description of the genitalia of the ♂ cotype in the Leiden Museum.

The specimen has at some time been damaged, the left clasper and the left apex of the tenth segment being broken off. For this reason it was necessary to draw the right side of the specimen for a lateral view, but this has been reversed in tracing, for ease in comparison with the other figures.

Ninth segment dorsally with a median, longitudinal ridge, separating two deep, oval depressions extending back almost to the basal margin of the segment. Side-pieces of the ninth segment rounded. Tenth segment fused to ninth, lateral margins from above convex, slightly elevated, forming the borders of another pair of oval depressions. From the side, there is a deep, quadrangular excision between the apex of the tenth segment and that of the ninth, apex of the tenth from the side obliquely truncate, lower margin sinuous. On each side of the segment, below the oval depression, is a small, hairy wart. Aedeagus slender, apex from above with an acute excision,

from the side dilated. In dorsal view, shortly before the apex there is a slight swelling, followed by a similarly slight constriction. Clasper with the terminal segment about two-thirds as long as basal segment.

The other ♂ cotype mentioned by McLachlan (the British Museum example) agrees closely with the Leiden cotype. This latter cotype being the one figured by McLachlan in his Monographic Revision (pl. 39), I am selecting it as *lectotype* of *Hydropsyche guttata* Pictet in preference to the one in our own museum. The lectotype now has the abdomen detached, cleared in caustic potash and preserved in glycerine in a small tube attached to the pin. The labels are Pictet, Genève; Museum Leiden, Hydropsyche guttata Pict.; Cat. No. 16; and my own lectotype designation label.

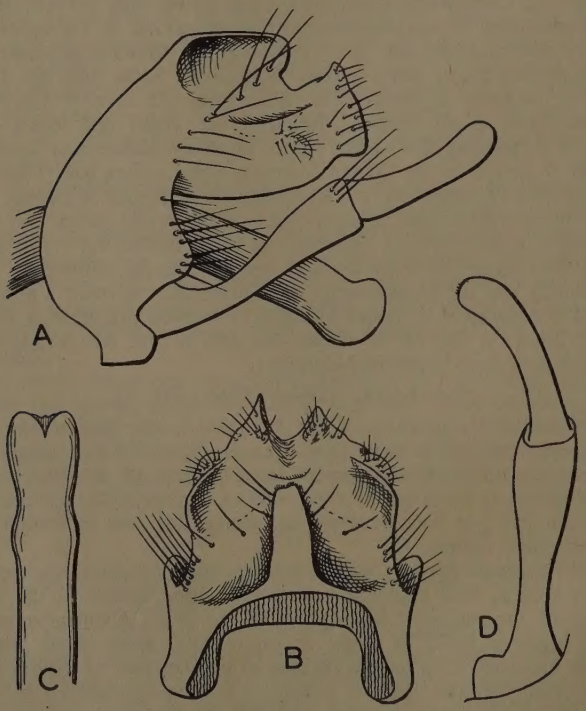

Fig. 1. *Hydropsyche guttata* Pictet. Genitalia of ♂ lectotype, Leiden Museum. (A), lateral (reversed drawing of right side); (B), ninth and tenth tergites, dorsal; (C), aedeagus, dorsal; (D), right clasper, ventral.

Hydropsyche ornatula McLachlan (Fig. 2)

Having satisfied myself as to the identity of *guttata* Pictet, I then turned to *ornatula* McLachlan. The description of this species was based on specimens from various localities in the Palaearctic region. In my 1949 paper (p. 35), when designating a lectotype I was faced with the choice between specimens from Zeller's collection (part of the McLachlan collection) or examples in McLachlan's British collection vaguely recorded in the original description as 'near London'. Since there was no reason why one British example should be selected

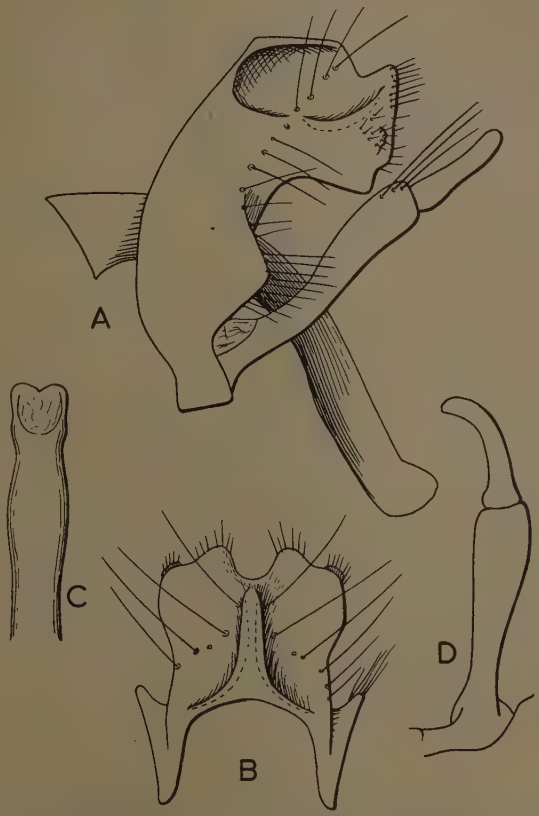

Fig. 2. *Hydropsyche ornatula* McLachlan. Genitalia of ♂ lectotype (B.M.N.H.). (A), lateral; (B), ninth and tenth tergites, dorsal; (C), aedeagus, dorsal; (D), right clasper, ventral.

in preference to any other, I chose a ♂ and a ♀ from the Zeller collection.

Subsequent detailed examination of the genitalia of the ♂ lectotype has shown that McLachlan's *ornatula* was a composite species, and that the British and many European specimens differ from the lectotype. The latter is closely related to *guttata* Pictet, but differs in having the terminal segment of the claspers about half as long as the basal segment. The oval depressions of the ninth and tenth segments are similar, but the tenth segment in dorsal view is less tapered and the apices more rounded. In side-view, the tenth segment is shorter and deeper and the dorsal notch between it and the ninth is a right-angle.

The *Hydropsyche ornatula* of British authors will therefore require a different name, but before re-naming it I decided to make a further study of the status of *H. contubernalis* McLachlan.

Hydropsyche contubernalis McLachlan (Fig. 3)

Originally described in the Trichoptera Britannica (1865, p. 129), McLachlan in his Monographic Revision (1878, p. 364) states definitely that *contubernalis* is a synonym of *H. guttata* Pictet. The McLachlan collection, when received at the British Museum (Nat. Hist.) in 1938, contained no specimens labelled *contubernalis*. It is curious that although he records the species as abundant on the River Thames between Kew and Richmond, I have been able to trace only four specimens of *Hydropsyche* in his collection from this locality (prior to 1865, the date of *contubernalis*). One can only presume that, being abundant, he only took a few specimens. One of the four is a ♂ referable to *guttata* Pictet, one a ♂ referable to *ornatula* auct., one a ♂ *exocellata* without abdomen and one without abdomen doubtfully referred to *guttata*. Neither male with abdomen agrees in the position of the aedeagus with the rather poor figure given of *contubernalis*, so one specimen at least must have been lost. In his Trichoptera Britannica, McLachlan quotes Kew or Kew to Richmond as the locality for only two species of *Hydropsyche, contubernalis* and *ophthalmica* (*exocellata*). The four specimens listed above were all collected between Kew and Richmond, 15.viii.1862 by McLachlan. It seems therefore that since he collected three species there and as *exocellata* is abundantly distinct by the male eyes, his *contubernalis* included two species. Against McLachlan's contention that *contubernalis* was a synonym of *guttata*, we have the statement that *contubernalis* is an abundant species, and yet we have little material of *guttata* in our British collection, which includes McLachlan's. *H. ornatula* auct. on the other hand is by no means uncommon. There is also the fact that many of the specimens determined by McLachlan as *guttata* have subsequently been found to be *ornatula* auct. (In view of the difficulty of making out the structure of the tenth segment in dried specimens, it is not surprising that McLachlan should have

confused these two species, especially as his optical equipment would only have included a hand lens and a monocular microscope, and his collection included very few microscope preparations.)

I therefore propose to restore to the British list the name *Hydropsyche contubernalis* McLachlan, to replace *H. ornatula* auct., *nec* McLachlan and to designate as *lectotype* the male which in my 1949

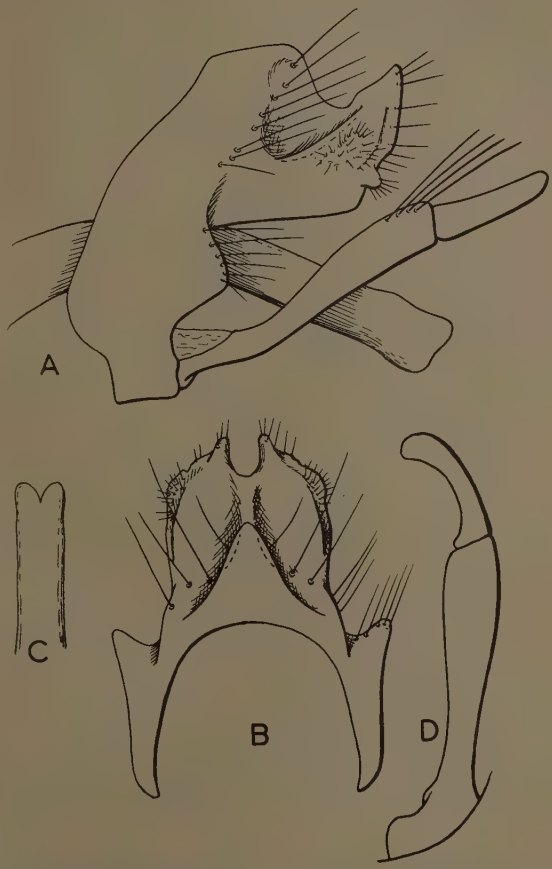

Fig. 3. *Hydropsyche contubernalis* McLachlan. ♂ Genitalia. (A), lateral; (B), ninth and tenth tergites, dorsal; (C), aedeagus, dorsal; (D), right clasper, ventral.

paper I suggested might be one of the type-series, with data:— Surrey; Between Kew and Richmond, 15.viii.1862, R. McLachlan. 38-62. McLachlan Coll. 1938-674. Hydropsyche guttata Pict. det. McLachlan. Hydropsyche ornatula McL. det. M. E. Mosely, and my own lectotype designation label. Abdomen cleared and preserved in a small tube of glycerine, attached to the pin.

Had a British specimen been originally designated by me as lectotype of *ornatula* McLachlan instead of the Zeller specimen, the final result as far as the British list would have been the same, since

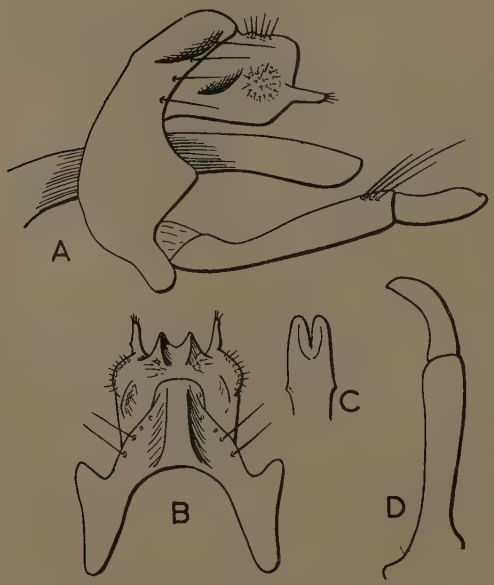

Fig. 4. *Hydropsyche fulvipes* (Curtis). ♂ Genitalia. (A), lateral; (B), ninth and tenth tergites, dorsal; (C), aedeagus, dorsal; (D), right clasper, ventral.

ornatula McLachlan would have become a synonym of *contubernalis* and the Zeller specimens would have required a new name.

The ♂ genitalia of *contubernalis* are rather more distinctive than those of the preceding two species. The oval depression on each side

of the median carina of the ninth segment is small and merged with that of the tenth, and nowhere reaches the basal margin of the ninth. The tenth segment from the side has a wide, right-angled excision of the upper margin and the upper apical angle is produced upwards in a triangle of about 45 deg. Near the lower apical angle is a small process and above it a large, hairy wart. Aedeagus slender, scarcely dilated apically, apex excised. Terminal segment of clasper about half as long as basal.

Hydropsyche fulvipes (Curtis) (Fig. 4)

In Mosely's Handbook (1939, p. 190) it is stated that this species is only distinguished from *instabilis* by its broader, brownish yellow wings. The male genitalia are certainly very similar to those of *instabilis*, but I think that there are slight differences in the shape of the tenth segment. From the side the upper margin is less elevated at the base and from above the hairy warts are more prominent and the apical excision is shallower. As no figure is given in the Handbook, I take this opportunity of remedying the omission.

The females of the British species of Hydropsyche (Figs. 5-8)

Dr. D. G. Denning, in a paper on the Hydropsychidae of Minnesota (1943), studied the female genitalia and found that they offered certain specific characters. I have endeavoured to use these characters for the separation of the females of the British species, but have been hampered by the lack of definitely associated females in some species. In this paper I am figuring the external genitalia of eight species but still lack authentic females of *guttata* Pict., a species which, as I have remarked earlier, does not appear to be common in this country. The keys and figures should be regarded as provisional, but I think it will be useful to put such information as I have at the disposal of other workers, who will probably be able to modify and add to it.

The characters which are of help in identification are the shape of the eighth tergite (8T) and sternite (8S); the shape of the opening of the clasper receptacle (CB) and clasper groove (CG) and the lateral lobe (LL) of the ninth tergite (9T) and the shape of the lower angle of the tenth tergite (10T). These differences are not always easy to put into words, but it is hoped that the following key, together with the figures, will help with the identification of our Hydropsyche females. These characters can generally be made out fairly clearly in fluid preserved specimens, although at times the ninth tergite is retracted and partly obscured by the eighth segment. With pinned specimens it may be necessary to remove the apical part of the abdomen and clear it by soaking or boiling in caustic potash solution. Such preparations may subsequently be preserved in small tubes of glycerine, which can be re-attached to the pin of the specimen.

Provisional key to the females of British species of **Hydropsyche** (except **guttata** Pict.)

1 Opening of clasper receptacle small, inconspicuous (Fig. 7) *angustipennis* (Curtis)
– Opening of clasper receptacle large, conspicuous 2
2 Basal margin of opening of clasper receptacle with an acute projection (Fig. 6) ..... *contubernalis* McLachlan
– Basal margin without such projection, but sometimes with a small, rounded lobe at upper end of basal margin 3
3 Clasper groove of ninth tergite long, straight and narrow (Fig. 5) ..... *fulvipes* (Curtis)
– Clasper groove not long, straight and narrow 4
4 Apical margin or eighth tergite in side-view rounded (Fig. 8) *exocellata* Dufour
– Apical margin truncate 5
5 Opening of clasper receptacle with a small, rounded lobe on upper basal margin 6
– Opening without such lobe (Fig. 5) ..... *pellucidula* (Curtis)
6 Lateral lobe of ninth tergite gently rounded (Fig. 7) *instabilis* (Curtis)
– Lateral lobe bluntly triangular (Fig. 8) ..... *saxonica* McLachlan

Hydropsyche ornatula McLachlan (Fig. 6)

The female genitalia of this species are drawn from the ♀ lecto-allotype. They resemble those of *contubernalis* in having an acute projection on the basal margin of the opening of the clasper receptacle. The eighth tergite in side-view is much more tapered towards its apex, the lateral lobe of the ninth tergite is more acute, the lobe on the opposite side of the clasper groove is more rounded and the lower angle of the tenth tergite is more acutely rounded.

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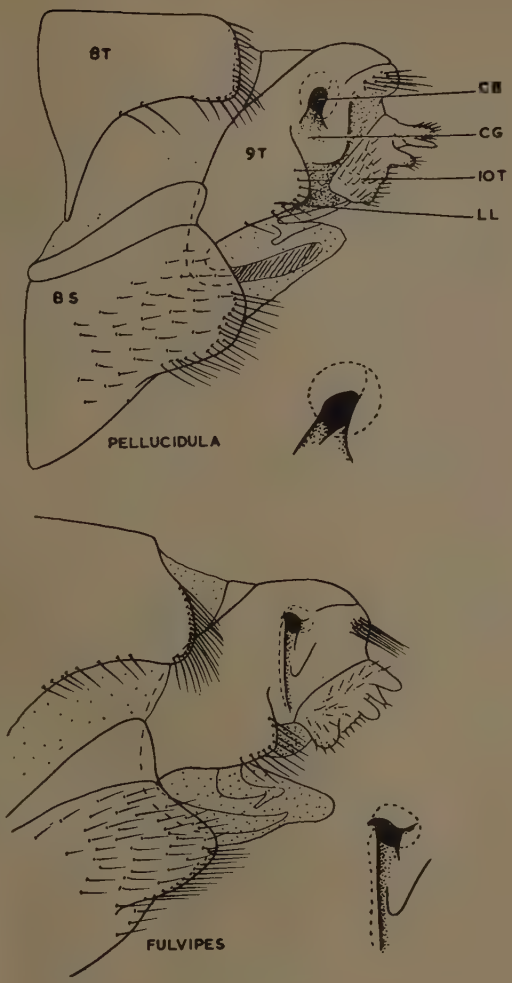

Fig. 5. ♀ Genitalia of *Hydropsyche pellucidula* (Curtis) and *H. fulvipes* (Curtis), lateral, with opening of clasper receptacle more enlarged. 8T, 8S, eighth tergite and sternite; 9T, ninth tergite; CB, clasper receptacle; CG, clasper groove; 10T, tenth tergite; LL, lateral lobe of ninth tergite.

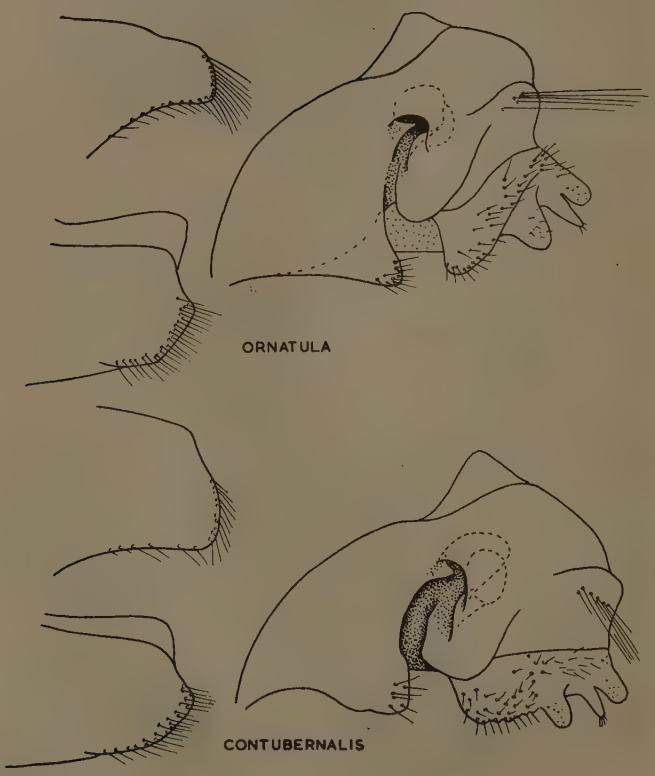

Fig. 6. Eighth tergite and sternite, ninth and tenth tergites of *Hydropsyche ornatula* McLachlan, ♀, and *H. contubernalis* McLachlan, ♀.

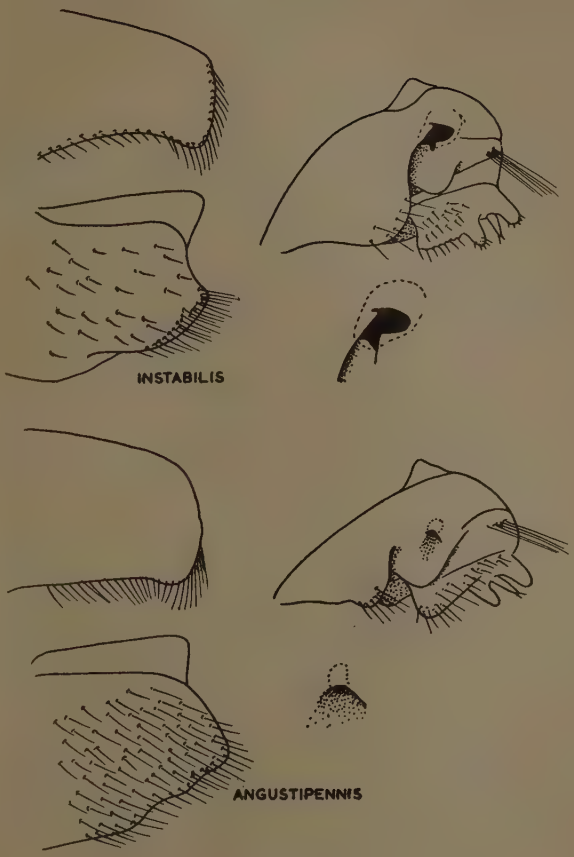

Fig. 7. Eighth tergite and sternite, ninth and tenth tergites of *Hydropsyche instabilis* (Curtis), ♀ and *H. angustipennis* (Curtis), ♀, opening of clasper receptacle, more enlarged.

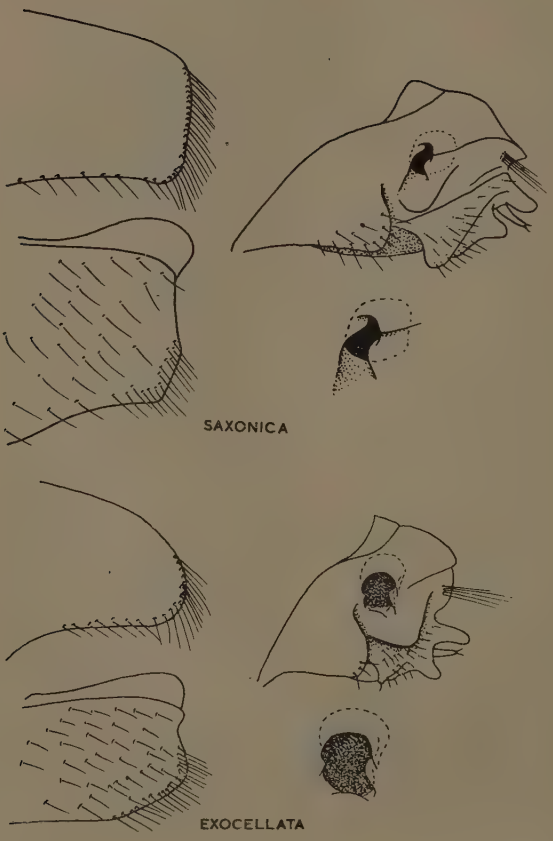

Fig. 8. Eighth tergite and sternite, ninth and tenth tergites of *Hydropsyche saxonica* McLachlan, ♀, and *H. exocellata* Dufour, ♀, opening of clasper receptacle more enlarged.

A PROBLEM OF DISTRIBUTION WITH SPECIAL REFERENCE TO *EREBIA EPIPHRON* (KNOCH) (LEP: SATYRIDAE)

By THE REVEREND J. H. VINE HALL, B.D., A.K.C.

Papers on the subject of *Erebia epiphron* (Knoch) (The Mountain Ringlet) not infrequently appear in our entomological periodicals, but I have never seen one which dealt with what to me is the most interesting feature of its distribution—its absence from North Wales. This fact seems to be simply taken for granted, and nobody appears to try to probe the mystery. This paper certainly does not claim to answer that problem, and it probably is true to say that at the present stage of our knowledge no absolutely convincing answer is possible. That does not mean, however, that there is no point in discussing the question.

At the present time the species occurs plentifully in the Lake District of Cumberland and Westmorland, and in a rather restricted area of the Highlands of Scotland centering on Perth and Inverness. It occurs in colonies, and consequently its distribution is patchy. For instance, I walked up from the top of Honister Hause along the side of Grey Knotts as far as Haystacks on a fine summer day in early July, 1949, and saw one worn male and two very fresh females, which, assuming that they had emerged close to where I saw them, may have been the offspring of a casual wanderer the previous season. On the other hand, I went to the Langdale Pikes in early July, 1953, and must have seen many hundreds of specimens. I quote these two instances, but I could quote many others which demonstrate the same point. On some of the Lakeland hills the species seems to be entirely absent. My impression is that its colonies are always situated on rocks of the Borrowdale Volcanic Series—that certainly is true of its chief colonies—but I would not wish to be dogmatic. I have a feeling that the species is absent from Skiddaw, Blencathra and the hills around the Coledale Pass—all composed of Ordovician Slates. A similar colonization is to be observed in Scotland, though my own personal experience of the species there is not very great. The apparent absence of any colonies west of the Caledonian Canal is extraordinary, and outside the scope of this paper, but recent exciting discoveries in other fields in that vast area lead one to the conclusion that the natural history of the North-west Highlands is so imperfectly known that *E. epiphron* may eventually be found there. I purposely stress the localization of this insect in colonies, as this may have some bearing on its present absence from North Wales. Apart from the Lake District and the Scottish Highlands the species clearly used to occur in Ireland and may do so still (Ford, 1945, pp. 288-9), though the most recent searches have failed to track it down (Haynes,

1956). This extinction, if extinction it be, may also have a bearing on its absence from Wales. I was extremely interested to be told that there is some evidence that the species has been seen on Great Whernside (2,310 ft.) at the head of Wharfedale in Yorkshire. There are large tracts of apparently suitable country on many of the higher Pennine hills and this report needs careful investigation. My informant himself paid Great Whernside a visit, but as the weather was none too kind his failure to find it is not conclusive. It is almost impossible to find a specimen even where there are in fact hundreds of them if the weather is unsuitable. The remoter and higher Pennine hills with their long marshy slopes might certainly have held colonies in the past, even if they do not hold them still. The apparent extinction of another *Erebia* species—*E. aethiops* (Esp.)—at Grassington only a few miles from Great Whernside emphasizes how rapidly a flourishing colony can dwindle and disappear. So the present distribution of *E. epiphron* comprises the Lake District and the Scottish Highlands, with possible outliers in Ireland and Yorkshire. Thus the only mountain district in Britain from which there is absolutely no evidence whatever of its occurrence is Wales.

Now the really interesting thing is that there are parallels to this situation among alpine plants—botany and entomology cannot possibly be separated for they dovetail into one another at many points. The two most obvious instances of this are *Alchemilla alpina* L. (The Alpine Lady's Mantle) and *Saxifraga aizoides* L. (The Yellow Mountain Saxifrage). The former is a common plant of the Scottish Highlands, and it also occurs abundantly in the Lake District, especially on the Borrowdale Volcanic rocks, for it is not partial to the Ordovician or the Silurian slates; it occurs sparingly in Ireland, being found in two divisions (Praeger, 1950), and in one place in Yorkshire on the Howgill Fells near Sedbergh, where, however, I failed to find it when I looked for it. But it is absent from Wales except that it once appeared where apparently it was planted (Campbell in 'Snowdonia', 1949, p. 192). The parallel between this and *E. epiphron* is very striking. The parallel with the Yellow Mountain Saxifrage is hardly less striking. It is common in the Scottish Highlands, especially on base-rich rocks, being, unlike the Alpine Lady's Mantle, especially fond of limestone and also descending to a much lower altitude. It occurs frequently in the Lake District, avoiding the acid rocks, and spreads across the Pennines, where it is common in Teesdale and many other limestone districts, being a feature of the high Yordale limestone terraces of Ingleborough and Pen-y-Ghent and occurring also on the main mass of Carboniferous limestone below, but absent from the Yordale shales in between. In Ireland it occurs in six divisions (Praeger, *loc. cit.*), but Campbell (*loc. cit.*) states that its status in Snowdonia is doubtful—though it is usually agreed that it is entirely absent by botanists who have knowledge of the area. Thus *E. epiphron, A. alpina* and *S. aizoides* are members of a small

group of species which occur in mountain districts, but are absent from Wales. One feels strongly that there must be one underlying cause for this peculiarity of distribution.

Other species, some of them scarce, some common, occur in Wales, as well as in the other mountain districts of Britain. Among the scarce plants are *Saussurea alpina* L. (Alpine Saw-wort) and *Silene acaulis* L. (Moss Campion). Both occur far more frequently in the Scottish Highlands, but there are restricted colonies in the Lake District, where I have seen both of them on the Helvellyn range, and in Snowdonia. An example of a far commoner plant with the same type of distribution would be *Saxifraga stellaris* L. (Starry Saxifrage). Among Lepidoptera an example of a less common insect would be *Xanthorrhoë munitata* (Hübn.) (Red Carpet) which is frequent in the Highlands of Scotland. I have found it commonly here and there in Lakeland, and I also know of it in the Craven district of Yorkshire. Reference to the publications of the Chester Society of Natural Science shows that the species is reported from the Pennines as far south as the Goyt valley and also occurs, though apparently very locally, in Snowdonia. An example of a far commoner moth with the same type of distribution is *Entephria caesiata* (Schiff.) (Grey Mountain Carpet). Very many further examples could be given which go to show that, where a montane species is not among that large group which is entirely confined to the Highlands of Scotland, it is normal for it to occur both in Lakeland and in Snowdonia, in many instances appearing locally in the Pennines as well. In fact the small group of such species which are absent from Wales shows a decided abnormality and peculiarity of distribution. John Raven in 'Mountain Flowers' (1956) groups Lakeland and Snowdonia together in one chapter, and stresses (p. 101) their similarity of vegetation—incidentally mentioning *Nardus stricta* L. (Mat Grass), the food-plant of *E. epiphron*. He only mentions the differences where these concern a small number of species which have an exceedingly restricted range, and so hardly enter into the present discussion.

Professor Farmer considers (see 'Snowdonia', p. 192) that the small group of species which occur in other mountain districts of Britain but are absent from Wales failed to recolonize that area after the Ice Age, owing to the absence of intermediate areas of calcareous rocks. But (a) there is also a dearth of calcareous rocks between the Lake District and the Scottish Highlands, and the distance separating them is greater than that separating Lakeland from Snowdonia, and (b) how in that case can one account for the existence in Wales of, for instance, *Saxifraga oppositifolia* L. (Purple Saxifrage), which is as clear an indicator of base-rich rock as one could ever find? This species I have myself seen in the Scottish Highlands, in the Lake District on and around Helvellyn, on the high Yordale limestone cliffs of Ingleborough and Pen-y-Ghent, in Snowdonia, and on the Brecon Beacons. Large areas of country now unsuitable separate

each of these stations. Max Walters, in his section of 'Mountain Flowers', stresses (p. 82) that lime-loving species following close on the heels of the melting ice would find great areas of chalky boulder-clay in which they could thrive, much of which has since been eroded or leached. We are asked to imagine montane species of plants and insects spreading into and up the country while tundra conditions still prevailed, and, when warmer conditions finally supervened, finding the only niches where they could survive in the higher areas of the mountains. This precisely fits the present distribution of such a plant as the Purple Saxifrage or such a moth as the Red Carpet (ignoring the sub-species occurring in Shetland). But it emphatically does not fit the group of species with which this paper is concerned. Dr. Beirne in 'The Origin and History of British Fauna' (1952) classes *E. epiphron* among the glacial-phase survivors (p. 57) and assumes that it spread in a glacial phase into Southern England, finding its way to the mountains in the last interglacial period, and being forced to retreat again during the final glacial phase. He assumes that by then it had developed sub-specific characters and that this subspecies, *mnemon,* was split into two when the ice advanced, the present population of the Lake District being descended from those specimens which survived south of the ice-fronts and the present population of the Scottish Highlands being descended from those which survived west of the ice-fronts, in the northern part of the Celtic Land. It certainly looks, from the fact that the British race forms a subspecies (the apparently different subspecies in Ireland raises quite different questions) as if *E. epiphron* must have arrived here a long while ago, and is not a species which simply spread when the final glacial phase began to decline—indeed, the final glacial phase was possibly not severe enough to create conditions for the spread of this species across Europe from the Alps to Britain. But Dr. Beirne's analysis does nothing to explain why the species should now be absent from Wales. Indeed, one would assume that the population surviving south of the ice-front would spread into Wales as well as into the Lake District, as the populations of so many other species clearly did.

Two possibilities seem to emerge. One is that *E. epiphron* used to occur in Wales and has become extinct. The possibility that it has within recent years become extinct in Ireland, and also perhaps in Yorkshire, if indeed it ever really did occur there, certainly lends support to this theory. And the fact that it occurred in sharply defined colonies would also tend to predispose it towards extinction if adverse conditions became severe enough. But one feels bound to stress once again that it would be most satisfactory if an explanation could be found which would cover the whole group of species now absent from Wales. It is difficult to imagine that the Alpine Lady's Mantle spread into Wales and has become extinct. It is a flourishing plant which occurs in great profusion. It is apomictic—that is, it sets seed without

any fertilization—and this helps to ensure its continuance in adverse conditions. One can more easily imagine the Yellow Mountain Saxifrage becoming extinct, though even this seems unlikely when one remembers how many eminently suitable situations for it are to be found in the heart of Snowdonia, where many far rarer plants still survive. The other possibility which I only throw out as a hint and cannot corroborate with any concrete evidence, is that this group of montane species are all survivors from an interglacial epoch, and that they all survived the final glaciation to the west of the ice-fronts in the northern part of the Celtic Land. This assumes that they were not reinforced by fresh arrivals from the south when the ice finally began to retreat. They then were able to recolonize only those parts of the country which did not prove impenetrable to them. The large area of low-lying marshy land between the Lake District and Snowdonia proved to be a barrier which they could not cross, and which would in any case necessitate an unnatural southward movement, whereas the hills of south-western Scotland provided no such obstacle. There is no need to assume that the population of *E. epiphron* was split into two, though it indeed may have been. After all, the differences between race *mnemon* and race *scotica* are so slight that post glacial isolation could surely account for them. The original subspeciation is the significant thing and this suggestion allows for its isolation in the North-west long enough for this to take place.

I emphasize again that this suggestion is only a hint at an explanation which might cover the present absence from Wales of this small but significant group of species. If those with greater knowledge and experience than I have will make a contribution to this fascinating problem then this paper will have served its purpose.

Hutton Roof Vicarage,
Westmorland.
22nd January, 1957.

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THE WEEKLY ENTOMOLOGICAL PERIODICALS OF GREAT BRITAIN

By E. W. CLASSEY, F.R.E.S.

I wonder how many people these days know of *The Weekly Entomologist*? This periodical commenced publication on Saturday, 16th August, 1862, and ran until Saturday, 7th November, 1863—in all 65 numbers at 2d. each.

The Weekly Entomologist succeeded *The Entomologist's Weekly Intelligencer*—which was the first weekly entomological paper ever published. The *Intelligencer* ran from Saturday, 5th April, 1856, to Saturday, 28th September, 1861; it was printed and published by Edward Newman and edited by H. T. Stainton, and the price was one penny per weekly part.

It was intended that the *Intelligencer* should be published only during 'the season' and that it should 'go into hibernation' for the winter.

It soon became apparent that there was a demand from a large number of subscribers for the periodical to continue through the winter. This demand seemed to surprise the editor, who declared that he was not prepared to continue publication the year round.

By the end of August, 1856, so many requests for the continuance of the periodical had been received that Stainton had second thoughts on the subject and stated in the editorial of the number for Saturday, 30th August:—

> 'The *Intelligencer* will hibernate:—No. 26 will appear on the 27th September, 1856, and No. 27 on the 4th April, 1857.
>
> 'At the same time, whilst making this announcement, we do not wish to be thought by any means unmindful of the wants of our readers. Though we cannot supply an *Intelligencer* during the winter, perhaps we may be able to make some arrangements to supply a brumal substitute for it; but the consideration of the form, nature and price of that substitute we must reserve till our next Number.'

In the issue for the following week (Saturday, 6th September, 1856) it was announced that the decision had been reached to publish such a substitute—the announcement was made in the following terms:—

> 'On Saturday, the 25th of October, will be published the First Number of
>
> THE SUBSTITUTE;
> Or, Entomological Exchange Facilitator and
> Entomologist's Fire-side Companion.
>
> 'This will continue weekly for twenty weeks.
>
> 'Each number will consist of twelve pages duodecimo, price 2d.'

The *Intelligencer* resumed publication, as promised, with No. 27 on 4th April, 1857, and thereafter continued summer and winter

without a break until it ceased publication at the end of Vol. 10.

Although no such reason was given by the editor or publisher, it was suggested by the Rev. F. O. Morris in a letter to the editor in the last part published (Vol. 10, p. 206) that the circulation had fallen off, and that this may possibly have been due to the fact that a charge had been imposed for the insertion of exchange lists.

The Weekly Entomologist was edited by Mr. T. Blackburn, of Bowden, Cheshire, and bore the imprint '*Printed for the Altrincham and Bowden Entomological Society by Thomas Balshaw and Son, 32 Church Street, Altrincham, in the County of Chester*'.

Volume 1 consisted of 26 numbers and ran from Saturday, 16th August, 1862, until 7th February, 1863; it was dedicated to 'Henry Tibbatts Stainton, Esq., F.L.S. The Editor of the first weekly entomological paper' 'as a mark of esteem'.

Volume 2 also consisted of 26 numbers—Saturday, 14th February, 1863, to 8th August, 1863; it was dedicated to 'J. C. Dale, Esq., M.A., F.L.S., C.P.S., Etc., Vice-President of the Dorset County Museum, and one of the oldest and most scientific of British Entomologists' 'as a mark of friendship and esteem'.

During the progress of Vol. 2 it was announced that 'On and after Saturday, 2nd May, 1863, the address of the editor of the *Weekly Entomologist* will be:—The Yews, Woodford, London, N.'—and by Saturday, 23rd May (Vol. 2, No. 15), the printers were changed and the imprint became '*Printed by R. & A. Wood, General Printers, Engravers and Lithographers, at their Offices, Liverpool Road, near the Agricultural Hall, Islington, London, N*'.

The third (and last) volume consisted of 13 numbers, dated from Saturday, 15th August, 1863, to 7th November, 1863. (The weekly parts of Vol. 1 were numbered 1-26, of Vol. 2, No. 1.-Vol. 2 to No. 26.-Vol. 2—but the parts of Vol. 3 were simply numbered Nos. 27 to 39, as if they were a continuation of Vol. 2.)

A title page to the 3rd vol. was issued, but no dedicatory page was printed (at least the writer has never seen one).

These three periodicals, the *Intelligencer*, the *Substitute* and *The Weekly Entomologist* comprise all the *weekly* entomological publications which have been, or are likely to be published in Great Britain. The *Intelligencer* is not uncommon, but the other two are decidedly rare. Many interesting controversies raged in their pages and they all make fascinating reading.

PARASCOTIA FULIGINARIA (L.) IN MIDDLESEX (LEP: PLUSIIDAE)

A male specimen of The Waved Black (*P. fuliginaria*) was in my mercury vapour light trap on the morning of 29th July, 1957.

Feltham, E. W. CLASSEY.
Middlesex.

THE LARVA OF *STENOPHYLAX INFUMATUS* McLACHLAN (TRICHOPTERA: LIMNEPHILIDAE)

By HILMY M. HANNA, B.SC., M.SC., F.R.E.S.
(Zoology Department, University of Reading)

On 23rd May, 1953, forty-two larvae and two pupae were collected from a small stream feeding a large lake in Lyme Park, Disley, near Manchester. The larvae were found crawling at the edge of the stream among plant growths. The bed of the stream was formed of stones and patches of sand. On 15th June adults started to emerge in the laboratory and were identified as *Stenophylax infumatus*.

The following details are derived from the study of the fully-grown specimens.

Case

The cases are slightly curved ventrally and up to 20 mm. long and 7 mm. wide. They are made of dead vegetable material with three or less commonly four stalks attached along the whole length of the case. These stalks were up to 40 mm. in length, while Ulmer (1909) has recorded them up to 60 mm. in length. All the cases examined were cylindrical. The posterior opening of the case is smaller than the anterior opening.

Larva

The larva is eruciform. The larvae examined measured up to 23 mm. long and 4.5 to 5 mm. wide. Ulmer recorded lengths up to 25 mm.

Head

The head is hypognathous and ovoid in shape. The frontoclypeus is darker than the anterior surfaces of the genae and carries some dark spots at the oral end and a group of 10-13 dark spots at the aboral end. The genae bear a number of black spots of variable size. Posteriorly the gena has a lighter area above the labium on each side. The gular sclerite is chestnut brown and does not separate the genae completely. The genal suture is open.

Labrum

The ventral margin of the labrum has a slight concavity, on each side of which are five setae. There is a group of hairs between the two most lateral setae. The labrum has a brown band which carries a central black spot and three dark patches at the ventral margin. The lateral margins of the labrum are heavily sclerotized.

Mandibles

Each mandible bears four teeth, a brush on the inner surface and a single seta on the outer surface near the base.

Maxilla

The cardo is small and bears a single seta. The stipes bears a long

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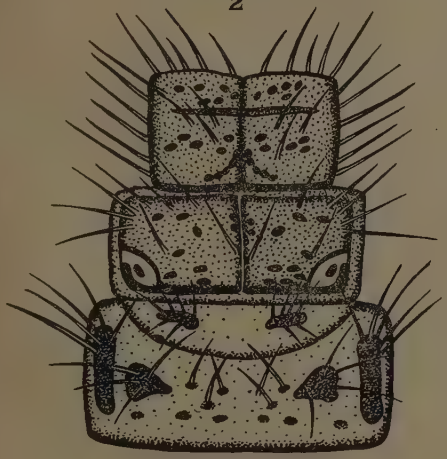

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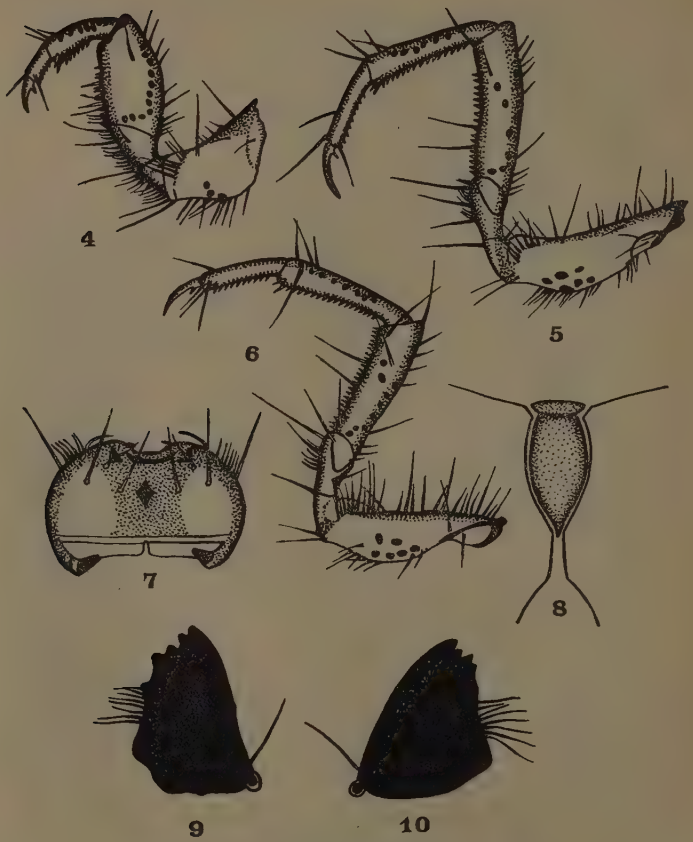
STENOPHYLAX INFUMATUS McL.

Figs. 1-3: (1) Larval case. (2) Head from the front. (3) Thoracic nota from above.



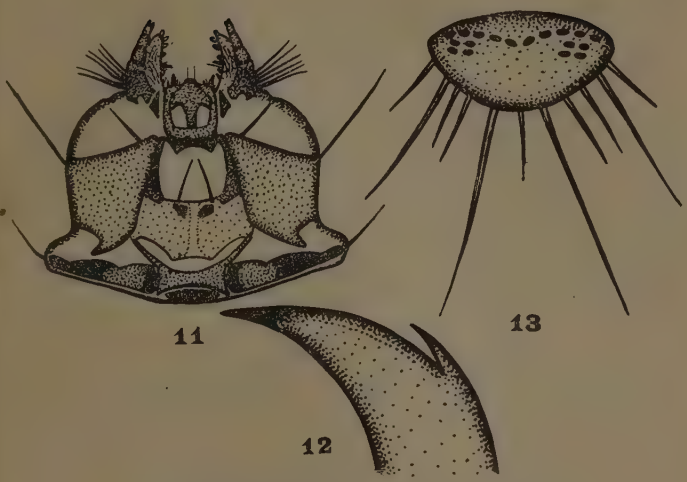
STENOPHYLAX INFUMATUS McL.

Figs. 4-10: (4) Prothoracic leg. (5) Mesothoracic leg. (6) Metathoracic leg. (7) Labrum. (8) Gular sclerite. (9) Left mandible. (10) Right mandible.

lateral and a short median seta. The maxillary palp has five segments. The lacinia carries a few sensillae and many hairs.

Thorax

The pronotum is entirely sclerotized and has a median longitudinal suture. It is yellowish brown in colour with dark markings, and has a horizontal grove anteriorly which forms a cross with the median



STENOPHYLAX INFUMATUS McL.

Figs. 11-13: (11) Labium and maxillae. (12) Anal claw from below. (13) Anal sclerite from above.

suture. The mesonotum is sclerotized except for its margin and possesses a golden yellow area with a central black spot at each posterior corner. The mesonotum is darker than the pronotum and carries dark markings. The metanotum has six small sclerites, each of which carries a number of setae. The prosternal horn is present but there is no prosternal sclerite.

Legs

The prothoracic leg is short and robust. The mesothoracic leg is slightly longer than the metathoracic leg. The inner surfaces of the femur, tibia and tarsus bear small spines. The trochanter and femur of the prothoracic leg bear many hairs on their inner surfaces. The tibiae of all legs bear two spurs.

Abdomen

On the first abdominal segment there are three protuberances of which the dorsal one is devoid of setae. The lateral protuberances bear few setae. The sternum of the first abdominal segment bears many setae at the bases of which there are dark brown areas. The gill filaments which are present on segments two to seven are single. The anal sclerite is golden yellow in colour with dark brown spots on its anterior half. This sclerite is elliptical and bears four long setae and a number of short ones. The anal appendages are two-segmented and the anal claw bears a small auxiliary claw at its

base. The lateral line running from segments three to seven is formed of fine hairs. Above the lateral line there is a line of seven to nine sclerotized pustules on the third to the seventh abdominal segments.

The black spots on the anterior surfaces of the genae of *Stenophylax infumatus* are much larger than those on the genae of the other six recorded species of *Stenophylax,* and therefore may be easily confused with those of *Halesus.* Ulmer (1909) pointed out that the chitinous shields of the pronotum are distinctly separated in *Halesus,* while they are very close in *S. infumatus.* Ulmer and Lestage stated that the presegmental gills were absent on the second abdominal segment in *Stenophylax infumatus,* while they were present in *Halesus,* but on the other hand they were present on most of the specimens of *S. infumatus* here examined.

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BOOK REVIEW

First International Symposium on the Control of Insect Vectors of Disease. Rome. 1954. 393 pp. Illustrated. Wrappers. Price in Great Britain £2 17s. 6d. (Published in the British Commonwealth of Nations by Blackwell.)

This is a volume of nearly 400 pages in which are printed a series of contributions by authors from various countries. In this country we print first the contribution and add a summary at the end, whereas in this volume summaries in Italian, French, English and German precede the contribution of the author.

Only medical entomology is dealt with, although several of the papers are of a wider interest. For instance, a paper by M. Pinotti on insect resistance and behaviouristic modifications of certain insects, etc.; Dr. Chadwick's contribution on basic studies in insect physiology in relation to mechanisms of resistance to insecticides, and several others.

There are introductions by three Italian entomologists preceded by a short preface by the late Professor P. A. Buxton who, unfortunately, is described as 'E. A. Buxton' not only in the signature but also below the photograph facing p. 12 and again in the Index at the end of the volume.

FRANK BALFOUR-BROWNE.

NOTES ON SOME LARVAE OF THE GENUS *APAMEA* TREITSCHKE (LEP: CARADRINIDAE)

By G. HAGGETT

The genus *Apamea* as recognized by Tams and Heslop comprises species of very different life history patterns with diverse forms of larvae and it is not possible to treat as one group the larvae of all the species. At least three very distinct types are included, while the elusive *zollikoferi* Frey. may prove to belong to a fourth.

It is with larvae of the group that contains the generic type that this paper is concerned, that is to say with *sordens* (Hufn.) (*basilinea* (Schf.)) (type of *Apamea*), *infesta* (Ochs.) (*anceps* (Hb.)), *crenata* (Hufn.) (*rurea* (F.)), *characterea* (Hb.) (*hepatica* (Hb.)) and *obscura* (Haw.) (*gemina* (Hb.)). Usually associated with these are *unamimis* (Hb.), *pabulatricula* (Brahm) and *scolopacina* (Esp.), yet if these are admissible then there can be no real objection to including *Eremobia ochroleuca* (Schiff.); with the exception of the extinct *pabulatricula* (Brahm); larvae of these are well known in Britain and are easily identified. The larvae of *secalis* (L.), *ophiogramma* (Esp.) and *ypsilon* (Schiff.) (*fissipuncta* (Haw.)) are so very distinct and behave in so dissimilar a manner that they can never be confused with the true Apameas, while the subterranean larvae of the former Xylophasias (*monoglypha* (Hufn.) group) again share a uniform pattern that is well separated from the *sordens* (Hufn.) group.

Because of their great similarity the larvae of the true Apameas are not easy to distinguish from one another: they not only appear alike but they have similar habits and follow a common time-table of progress throughout the seasons. While they are mostly common and widely distributed species, they are not all easily found in the larval stage, and one in fact remains unknown in the wild state. Eggs hatch from May to July and the young larvae feed at first on the flowers and young seeds of grasses and grain, growing slowly until the autumn. There appears to be no true hibernation and sporadic feeding may take place during any mild spell in winter. As soon as gentler conditions return in February and March good-sized larvae will be found after dark, indeed it is rarely of much use seeking *characterea* after the first week of March in southern England. During the later instars grass blades are eaten. About a month is spent in the pupal stage, which is passed in a loose cell spun amongst grass roots.

The fully-grown larvae are very dull and cryptically coloured, possessing a pale dorsal stripe, weaker subdorsals and broad spiracular bands: they have well armoured rounded heads and hard shining plates: tiny black tubercules are set on rounded, flattened chitinous patches: in form these larvae are solid and cylindrical, broadest at the centre and with considerable taper at the last segment: they are all about 35 mm. long at this stage.

SUMMARY DESCRIPTIONS OF THE LAST INSTAR LARVAE

A. sordens—dull putty brown finely freckled with darker; dorsal line thick, bounded by a broken black line; subdorsals indistinct but continuous; spiracular bands broad, edged immediately above by black patches; head dark brown; trapezoidal warts tiny.

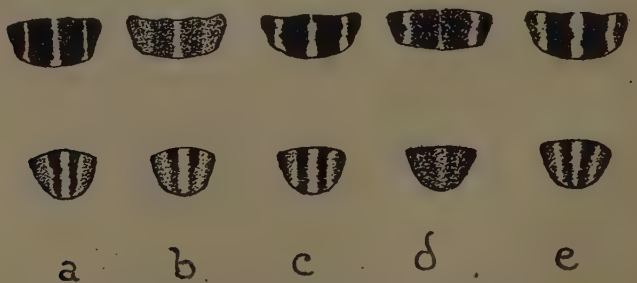
A. infesta—pale putty colour; dorsal line thick, bounded by dusky shading; subdorsals clear and continuous; spiracular bands broad; head reddish brown; trapezoidal warts tiny.

A. crenata—colour variable from rosy red or shades of brown to drab pallid ochreous, rarely uniformly greyish, always with darker dorsal grey shading in the form of large diamonds; dorsal line very narrow; subdorsals weak and broken; spiracular bands broad; head dark brown; trapezoidal warts small and weak.

A. characterea—more unicolorous than the others, dull rosy or dusky pinkish; dorsal line very narrow; subdorsals barely discernible; spiracular bands very broad; head dark brown; trapezoidal warts heavy and conspicuous.

A. obscura—drab pale brown, finely freckled with darker, and slate grey above the subdorsals; dorsal line thick; subdorsals pale orange, well marked and continuous; spiracular bands broad; head dark brown; trapezoidal warts small and weak.

Of the salient features compared above, some are so slight that they are of little help to the unpractised eye, others are variable, and most depend upon the full comparison of living specimens of all species at the same time. A more positive means of their identification is the pattern of the prothoracic and anal plates and details of these are given below. Both plates have the same simple scheme, being traversed by a central (dorsal) line with another (subdorsal) line to each side of it, but on the anal plate a darkening of the space between dorsal and subdorsal may give the appearance merely of two dark bands; the shape of the prothoracic plate differs between some species but is not easily expressed.



Prothoracic and anal plates of Apamea larvae.
a, *Apamea sordens* (Hufn.); b, *A. infesta* (Ochs.); c, *A. crenata* (Hufn.); d, *A. characterea* (Hb.); e, *A. obscura* (Haw.).

	Prothoracic plate.	*Anal plate.*
A. sordens Fig. a.	uniform black-brown, bold dorsal and thinner subdorsals.	pale brown, and blackish between bold dorsal and weak and narrow subdorsals.
A. infesta Fig. b.	pale red-brown, and darker between dorsal and subdorsals, the latter reddish suffused.	pale brown, and darker between broad dorsal and weak subdorsals.
A. crenata Fig. c.	uniform black-brown, dorsals and subdorsals equally distinct.	pale brown, and darker between bold dorsal and subdorsals.
A. characterea Fig. d.	uniform black-brown, dorsal obscured, subdorsals strong.	uniform black-brown, a weak dorsal, subdorsals obscured.
A. obscura Fig. e.	brown, and blackish between equally strong dorsal and subdorsals.	pale brown, and darker between bold dorsal and subdorsals.

PAPILIO MACHAON L., AND *GOUTWEED* (LEP: PAPILIONIDAE)

Whilst rearing a batch of *Papilio machaon* larvae in 1955 I ran short of both their natural food-plant and garden carrot. Until fresh supplies could be found, I tried in desperation to find some substitute, mainly among the umbelliferous plants. Eventually they settled for Goutweed (*Aegopodium podagraria* (L.)), or, as I believe it is more commonly known, Ground Elder.

Two points of interest arise from this experience. This is another addition to the list of food-plants of this insect, and one that is not only common but is a positive menace in the garden. The other, that the larvae take to it so readily; in fact, when given this plant and garden carrot at the same time they showed no particular preference for the latter.

To complete the experiment, I then continued to feed them solely on Goutweed until they pupated. This they did and produced perfectly normal imagines the following year. Due to all causes, about 10 per cent. failed to produce perfect imagines, this includes cripples, a casualty rate that I think is fairly normal.

A. R. DAVEY.

Hillside, Hatch Lane,
Bucklebury, Berks.

I had a similar experience in October, 1955, with *P. machaon* larvae from the Camargue, S. France. The larvae were given Parsley (*Petroselinum crispum* (Mill.)), which proved a satisfactory substitute.

A.E.G.

TIMES OF FLIGHT OF *APATURA IRIS* (L.) (LEP: NYMPHALIDAE)

By I. R. P. HESLOP

I. Introductory Note

In the literature on the subject of this species there is recorded a wide divergence of opinion on the flight times, and the various circumstances affecting the flight, of the Purple Emperor butterfly. I have therefore for some years been making careful and timed observations, and keeping full records, with a view to trying to extract a formula or formulae. It is a provisional statement that I now offer: and I would welcome comments and additional data with a view eventually to the issue of a revised statement. I submit these notes therefore with some diffidence: though I am satisfied that the present data on the aspect in question of this fascinating insect do seem to be falling into some kind of comprehensive pattern.

All times given are by British Summer Time.

II. Standard Flights

1. EARLY

The Purple Emperor takes a low inquisitive flight to begin the day. This flight lasts from about 8.30 or even 8.0 a.m. until about 9.30 a.m. in normal weather. During this early flight the insect (both male and female) may alight on roads, visit puddles in the rides, seek manure heaps (in appropriate weather conditions), etc.: this consideration applies throughout the imaginal life of the insect. In hot dry weather—and note that the Purple Emperor prefers temperatures of under 70 deg. F. and that the male will not fly at all when the shade temperature is above 85 deg. F.—the early flight may be prolonged to 10.30 or even to just after 11.0 a.m.: but in that case the insects will immediately thereafter cease flying altogether for the rest of the day (except perhaps during the late evening). When the early flight is thus prolonged there is a marked tendency for a last brief low alightment (e.g. on road surfaces, etc.) immediately before it ceases; and in practice this alightment has often been observed to occur at just about 11.0 a.m.

When, on the other hand, the weather is dull and cold and otherwise unsuitable, the early flight may not occur. In such event the insect may remain in or about its night resting-place in the trees, and not fly at all in the morning even if the weather ameliorates: but about noon launch straight forth from its bed into its soaring.

2. FORENOON (a) *Males*

In average weather it is most noticeable that there is a pause, at 9.30 or thereabouts, after the early flight. During this pause the Emperor appears to take a repast from the foliage or bark of oaks.

At about 10.0 a.m., however, he commences the forenoon flight. This is round the oaks (and in some cases certain other trees), with settlings of varying frequency and duration. The insects are usually much more wary now than in the early flight. As the morning progresses the flight gets higher and higher round the oaks until by about 1.0 p.m. (i.e. noon G.M.T.) the insects are no longer readily to be seen; but there is frequently a momentary flurry at just that hour even when the insect has previously been quiescent owing to dull conditions.

DITTO (b) *Females*

The wild, very rapid, erratic flight of the virgin females may be observed at any time after about 10.0 a.m. Unlike the males, they do not frequent one tree or group of trees. A female will, however, often confine its beat to a single ride.

3. AFTERNOON (a) *Males*

After about 1.0 p.m. some individuals definitely are seen to settle down to a siesta: others may be soaring. It is probable that during the next three hours or so they may do both at one time or the other. Courtship and mating probably occur most frequently now.

DITTO (b) *Females*

Although at other periods of the day the females do not normally frequent the oaks, in the afternoon the unfertilized female may do so in the same manner as the males. Yet the unfertilized female that chooses to fly abroad may wander more than she does in the morning, no longer keeping to one ride: also she has a more sober and purposeful flight than in the morning. The females, whether virgin or fertilized, are less affected by hot dry weather than the males. For courtship see (a) immediately above.

4. EVENING

From about 4.0 p.m. onwards the males are more in view, and there is a tendency for them to come lower. The female flying abroad will do so in the same manner as in the afternoon. The evening flight has usually ceased by 6.15 p.m. (end of July) for both sexes. But in such hot dry weather that the insect has not been flying at all since the early period, the commencement of the evening flight may be delayed until 5.30 p.m. or later; and in such cases the evening flight may culminate for both sexes in a quest for moisture that is so protracted—perhaps even to after 8.0 p.m.—as to disrupt and even displace the normal retiring routine. There is concrete evidence that in such conditions the insect, though still in most cases retiring to the tree tops, may in some cases settle down for the night on a post or tree-trunk, etc., in the immediate vicinity of the source of moisture last visited.

5. RETIRING

In average weather, and after a perceptible pause after the normal evening flight, both males and females may be seen preparing to take up quarters for the night: usually on oaks for both sexes,

probably on account of the sustenance to be obtained, though the female may favour an ash. They normally fly high about the tree for this purpose, usually on the side receiving the sun; and they may flutter about for as much as twenty minutes or more while choosing a bed and/or imbibing secretions. Save in exceptional cases they usually settle down by a time varying, very loosely, between 7.30 and 6.45 p.m. during the whole course of July. The female is usually more withdrawn and less in evidence than the male during this period; and there is some indication that while the male may repose among the foliage, the female chooses the upper trunk and the inner limbs of the crown of the tree.

III. Modifying Factors

A. The Observation Threshold

This factor is included here; though actually it does not affect the flight of the butterfly, but specifically only our own observance thereof. The value of all observations of the flight and habits of the Purple Emperor must depend directly upon its commonness in the area in question: reduced *ad absurdum*, no law can be extracted as to the factors inhibiting the flight of the Emperor from observations made in a locality where it does not exist! In actual practice a conclusion of the nature indicated cannot be of much value when from a locality where the Emperor, though existing, is hardly common enough to be observed at all—even under the most favourable conditions.

This brings me to the main point that I want to make here. I maintain that a butterfly must be *ecologically common* in order to reach 'observation density'. This consideration does not apply only to the Purple Emperor; but it certainly applies with full force to that species. How often does one hear of a species 'returning' to a locality after several years of 'absence'. In my opinion, in nine such cases out of ten the species has never been absent; but simply has not occurred in sufficient density to come over the *Observation Threshold*.

I wish to make it plain therefore that the conclusions in this paper are based on observations made, not in marginal localities, nor localities where the species is common enough to be seen only, but exclusively in localities where the Purple Emperor is *abundant*: i.e., as I may define such term, where the total of appearances in ten consecutive days at the height of the average imaginal season may be expected to reach one hundred, and where there is an optimum on at least one day of the season of twenty appearances.

B. Fresh Emergence

Within just the first two days (there is some evidence pointing to that actual duration) of the winged state, both male and female specimens may show a greater curiosity and venturesomeness than at any other time of their life: so that *at any time of the day*, and

even in weather that stops other specimens from flying, they may indulge in a flight resembling the early one; but do so even more persistently, inquisitively and intrusively.

C. RAIN

It is a highly significant fact that, despite its immense powers of flight, the Purple Emperor is actually on the wing for only a small fraction of the time that other butterflies are. 'An Emperor' giving brief glimpses over a favourite oak may be not one but perhaps two or three or more different specimens, as the spectator will not appreciate unless and until a dispute develops. In general (apart from the females either in their preoccupied or else in their more wandering moments) brief turns are separated by much longer periods of settling; or if the turns themselves are longer than usual, then they are punctuated by restless momentary pauses and separated from each other by even longer periods of settling.

But *after rain* the air-borne periods increase in length, and spells of settling are reduced. After a night thunderstorm following upon drought, total flight time of the individual may approach that of other species—such as the Silver-washed Fritillary *Argynnis paphia* (L.) and the White Admiral *Limenitis camilla* (L.)—so that for a morning or perhaps even a whole day the Emperor not only is but shows itself common. Under such circumstances, too, the flight is generally lower than usual.

Note that the male insect may occasionally fly during light rain even under a generally overcast sky. As regards the female insect flying during rain, see under Ovipositing.

D. WIND

The Emperor flies more freely in light breeze than in dead calm: and quite a stiffish wind may be helpful by keeping the insects comparatively low, when otherwise—e.g. in the afternoon—they might be out of sight.

E. NIGHT FLYING

I regard the phenomenon of occasional night flying by this species, especially at the full moon or in very hot weather, as an established feature. What the effect of this—when it occurs—on day flying may be, I am not yet sure.

F. DISPLAY

In every locality there will be a 'parading ground'—along a road or broad ride or railway, or even in a glade or a re-entrant of the wood. Here, then, flight will be freer than elsewhere. On, or in the vicinity of, this parading-ground there will probably be a 'master oak' which serves a vital purpose as a point both of meeting and of dispersion: thus ensuring continuous mixing of the stock and preventing the occurrence of inbreeding 'pockets'.

G. DISTURBANCE

Often when nothing seems moving, one may see a Purple Emperor make a hurried sortie. This is probably because of disturbance—most

likely by a Purple Hairstreak *Thecla quercus* (L.): which butterfly, when it is especially numerous, can be an inquisitive nuisance to the greater species.

H. INDIVIDUALITY

Alone with the Large Blue among British Butterflies the Purple Emperor appears to share the faculty of making sudden, often brief and always unanalysable, communal appearances. This faculty may be described as an idiosyncrasy of the species as such. But, unlike the Large Blue *Maculinea arion* (L.), the Purple Emperor can also have a marked idiosyncrasy of the individual: in that a single (not fresh) male specimen may sometimes be seen flying though not another is abroad, even where the species is abundant and when the season is at its height. This may occur both when, as sometimes happens, the species is quiescent as a whole despite apparently favourable circumstances and the indication of the hour: and also when conditions (quite apart from rain) outwardly appear to preclude flight altogether, and there has not been any question of disturbance. (The flight of a female under such circumstances would of course be attributable to ovipositing.)

But such male egregiousness is not so frequent as not to be noteworthy: it is in fact always abnormal, and not to be confused, for example, with the quite normal factor described under (B). What is clear, however, is that the most certain thing about this species is its own unpredictability.

I. OVIPOSITING

When the female is engaged on this she flies continuously and systematically at all hours of the day, though most conspicuously during the latter part of the forenoon. Her rests, and pauses for refreshment on the overhanging oaks, then are also systematic and regular. Much has been said, for example in regard to the appalling summer of 1954, of the allegedly harmful effect of bad weather at the time of ovipositing. Actually, I think this is negligible: and it may be remembered also that a cool August is probably conducive to a longer adult life. In my experience, when there is a shortfall of 'good' conditions the insect will make the most of bad ones; and I have seen the female ovipositing during conditions which have deterred not only the males of her own species, but all other butterflies also, from flight. She may lay her eggs even in continuous rain under uniformly heavy skies and in a chill wind. During ovipositing the flight is powerful and purposeful, but usually comparatively slow: save perhaps when she suddenly rockets over a belt of high trees or projects herself from one copse to another. Nor, further, is ovipositing in general interrupted by continuous hot, dry weather—as I myself saw in Sussex in 1933 in a shade temperature of 95° F.—though the female will then frequent the higher and deeper sallow brakes: while her lord lies motionless on his shaded couch.

It must be emphasized that these remarks apply to wild specimens

only. In captivity, the female requires for ovipositing a certain degree of warmth: and also, at all events in the sleeve, direct sunshine. In captivity, moreover, ovipositing normally will take place only during the forenoon.

J. COMPLETION OF OVIPOSITING

In the period of four to eight days after she has laid all her eggs and before exhaustion supervenes, the female approximates in flight habit to the male.

K. EXHAUSTION

Towards the end of his existence, when he is worn and tired, the male imago may come very low: usually still on the oak but in quite exposed places, making prolonged settlings in full view and offering easy chances. Unfortunately there is no doubt that such individuals constitute the majority of net-caught specimens in collections, thus unnecessarily giving 'caught' specimens a bad reputation. The female, on the other hand, usually appears to end her days in the thickets: though I have seen a poor rag of a female taking her last sun on an oak bush.

'Belfield', Burnham-on-Sea, Somerset.
15th August, 1956.

BOOK REVIEW

The Preservation of Natural History Specimens. Vol. I, Invertebrates, by Reginald Wagstaffe and J. Havelock Fidler. 1955. xiii + 205 pp., 139 text figs. H. F. & G. Witherby Ltd., London. Price £2 2s.

This admirable work will be of the utmost value to museum curators, specialists and collectors. The collation of scattered data, the compilers' practical experience and the excellent line illustrations provided by Elizabeth M. Begg, all provide a wealth of information on the mounting, preservation and storage technique for Invertebrates.

Divided into two parts, the first consists of 144 pages, and deals with the preservation of the Protozoa to Tunicata. Techniques for killing, preservation, microscopical mounting and staining are outlined, these followed by a short list of relevant references. Forty-nine pages are devoted to the Insecta, these dealt with under separate Orders. Far too much emphasis is given to the advisability of mounting on cards, the Orthoptera, Ephemeroptera, Odonata larvae, Plectoptera and Hemiptera. For museum display purposes this method has its obvious advantages, especially where juveniles treat cabinet drawers as battering rams, but for the specialist who wishes to examine a long series of insects for obscure underside characters (often of vital taxonomic importance)—the least said the better.

It is stated on page 54 that the Odonata should not be killed with ethyl acetate. Long experience has proved to your reviewer

that this killing agent is by far the most satisfactory, except for the red pigmented species. The latter respond well if killed by the fumes of sulphur dioxide (Moore, 1951). Colour preservation or imitation by such methods as stuffing with a cotton-wool covered stick, artificial tinting or drawing an embroidery silk strand through the abdomen have no place in a modern work. Lasting, and practically perfect colour preservation can be obtained with most species of Odonata if the vacuum drying method is adopted as outlined by Dr. B. P. Moore. This is not a low temperature method as suggested on page 59, nor is the reference to Moore's paper 1954 as suggested. It should read '1951'. *Proc. S. L. ent. nat. Hist. Soc., for 1949-50*: 179. In the section dealing with the preservation of Hemiptera-Heteroptera, no mention is made of the use of formalin for the preservation of many green Capsid bugs (Massee, A. M., 1949. Notes on Mounting and Collecting the Hemiptera-Heteroptera. *Ent. mon. Mag.*, **85**: 152). Another tip worth noting is that when 'blowing' larvae, a slight smear of vaseline applied to the point of the blow-pipe will prevent the larval skin from sticking to the glass.

The second part contains five appendices dealing with apparatus and instruments, reagents, labels and labelling, storage and microscopy. The work concludes with an adequate index. Readers should in no way be deterred by the few criticisms levelled at this work, it is of a high standard, contains a vast amount of useful information, it is well produced and is worth every penny of the price.

A. E. GARDNER.

A LETTER TO THE EDITORS

Dear Sirs,

The Committee of the Kent Field Club would like to appeal to your readers for information. We are anxious to compile a complete list of the fauna and flora of Kent, and feel that many people who have collected in the county would be willing to help us. Information is required regarding localities where common or rare species have been taken, also where they have *not* been taken although searched for.

Records of both micro and macrolepidoptera should be sent to Mr. J. M. Chalmers-Hunt, F.R.E.S., at 70 Chestnut Avenue, West Wickham, Kent. Records of other orders should be sent to the joint secretaries of the Club, The Museum, Maidstone, Kent. Finally, may I close by saying how extremely grateful we should be for the slightest information about any species, however common.

Yours truly

J. F. D. FRAZER, D.M., F.R.E.S.
(Chairman of Committee).

A NOTE ON SOME COLEOPTERA FROM THE EAST NORFOLK COAST WITH SPECIAL REFERENCE TO *NEBRIA LIVIDA* (L.) (CARABIDAE)

By A. E. GARDNER, F.R.E.S.

Whicher (1953) recorded finding the local Carabid *Nebria livida* (L.) plentiful in the clayey parts of the cliff at Happisburgh, Norfolk, in September, 1952. Unfortunately, in February, 1953, the disastrous gales followed by abnormally high tides destroyed the cliff up to a depth of fifty yards in places, and in consequence the species was destroyed, or so depleted in numbers that it could not be detected (Buck and Weal, 1953; Buck, 1953).

The locality was again visited in July, 1954, by Dr. B. P. Moore, Messrs. F. D. Buck, R. D. Weal and myself, but a diligent search failed to produce any specimens (Buck and Weal, 1954). It was not until July, 1955, that we were able to find the species, some fifteen examples, higher up the coast at West Runton (Buck and Weal, 1956).

As I was staying at Mundesley from the 1st to 14th September, 1956, I took the opportunity to work some twenty miles of the Norfolk coast for Coleoptera and in particular to determine the present status of *N. livida*. It is pleasing to be able to report that the species was found in small numbers at Happisburgh, Ostend and Walcott Gap. Suitable habitats are absent at Bacton, but south of Mundesley the cliffs reappear, often reach considerable proportions and contain many outcrops of blue clay—here *livida* was found in plenty right up to the built-up area. The area between Trimingham and Sidestrand appeared to be most suitable for the species; it could not be worked, however, owing to security reasons. No specimens were found between Overstrand and Cromer, largely it is thought, because of the generally very moist condition of the clay caused by the many springs in this area. Little blue clay occurs between Cromer and East Runton and only an odd specimen was turned up. Between West Runton and Sheringham ideal conditions prevail and the species was very plentiful, indeed, the dominant Carabid.

Without prior knowledge of the habits of the beetle it may well be overlooked even in an area where it occurs in some numbers. Generally, but not exclusively, it is found in the cracks and amongst the débris of the blue clay of the Cromer Forest Bed Series, often retreating in such narrow cracks that may well be passed over by the collector. Other profitable habitats worked were under the dried and cracked matts of clay at the base of the cliffs and under the broad basal leaves of a *Petasites* sp. Two trips were made along the

cliffs at dusk and on each occasion several *livida* were observed to be active.

Cliff falls to a greater or lesser degree were observed to continually take place along the entire area worked, but, having survived the great erosion of 1953, this fine Carabid appears to be able to adjust itself to changing conditions and to be firmly established.

Whilst collecting at Ostend I was interested to find an aggregation of nine specimens of *Pristonychus terricola* (Herb.) all under a small piece of blue clay measuring nine by three inches. This appears to be referable to the aggregation of *Agonum dorsale* (Pont.) found by J. B. Briggs (1956) at East Malling.

The following is a complete list of Coleoptera taken, species confined to one area being suitably indicated. The nomenclature follows that of Kloet and Hincks. *A check-list of British Insects,* Stockport, 1945. My best thanks are due to Dr. B. P. Moore for the identification of the Carabidae, Mr. H. R. Last the Staphylinidae, and Mr. J. L. Henderson the Curculionidae.

Carabidae: *Carabus violaceus* v. *sollicitans* Hart., *Nebria degenerata* Sch., *N. livida* (L.), *Notiophilus palustris* (Duft.). *Loricera pilicornis* (F.) moist area at Overstrand, *Dyschirius arenosus* Steph., single specimen at Mundesley, *Broscus cephalotes* (L.), *Asaphidion pallipes* (Duft.) single specimen at Mundesley, *Bembidion lampros* (Herb.), *B. nitidulum* (Marsh.), *B. stephensii* Crotch, *B. ustulatum* (L.), *B. andreae* (F.), *Trechus obtusus* Erich., *Harpalus aeneus* (F.), *H. rubripes* (Duft.), *H. rufipes* (Degeer), *Amara apricaria* (Pay.), *A. fulva* (Degeer), *A. aulica* (Panz.). *Feronia melanaria* (Ill.), *F. nigrita* (F.), *F. diligens* Sturm., *F. madida* (F.), *Calathus fuscipes* (Goerze), *C. piceus* (Marsh.), *C. melanocephalus* (L.), *Pristonychus terricola* (Herb.), *Synuchus nivalis* (Panz.), *Agonum ruficorne* (Goeze), *A. dorsale* (Pont.). Hydrophilidae: *Sphaeridium scarabaeoides* (L.), *S. lunatum* F. Silphidae: *Sciodrepa fumata* (Spence). Staphylinidae: *Stenus clavicornis* (Scop.), *Lathrobium fulvipenne* Grav., *Xantholinus glabratus* (Grav.), *X. linearis* (Oliv.), *X. longiventris* Heer, *Staphylinus stercorarius* Oliv., *S. globulifer* Geoff. in Fourc., *Quedius tristis* (Grav.), *Atheta angusticollis* (Thom.), *Drusilla canaliculata* (F.), *Aleochara bipustulata* (L.). Nitidulidae: *Cychramus luteus* (F.) 6 specimens found in a puffball (*Lycoperdon* sp.) at Mundesley. Coccinellidae: *Adalia conglomerata* (L.) v. *bothnica* (Pay.), *A. decempunctata* (L.), *Coccinella septempunctata* (L.), *Thea vigintiduopunctata* (L.). Lagriidae: *Lagria hirta* (L.) Chrysomelidae: *Lema melanopa* (L.), *Chrysolina staphylaea* (L.), *Gastrophysa polygoni* (L.), *Sermylassa halensis* (L.). Curculionidae: *Phytonomus austriacus* (Schrank), *Phytobius quadrituberculatus* (F.).

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BOOK REVIEW

Parasites and Parasitism, by T. W. M. Cameron, 1956, xix + 322 pp., 152 figs. Royal 8vo. Methuen, London. Price 35s.

The word 'parasite' is used in a wide sense in this book, and the author states in the Preface that 'etymologically this book might be called "Symbionts and Symbiosis" . . . it has seemed preferable to use "Parasites and Parasitism" instead, not because the terms are more accurate but because they are better known'. There is indeed a need for more restricted definitions of the various modes of parasitism, and of categories of parasites. Taken the word 'parasite' in a broad sense, a number of mosquitoes, blackflies and tsetses are as much a parasite as pupipara, sheep-ked, botflies, nostril-flies and myasis causing flies; to call the first category micropredators does not seem to present a suitable way out of difficulties.

The book is divided into two main parts. The first 200 pages are devoted to a discussion of the parasites in three groups: Protista (Bacteria, Fungi, Spirochaeta, Protozoa, Viruses and Rickettsiae), Lower Metazoa (Coelenterata and Helminths) and Higher Metazoa (Annelida, Arthropoda, Mollusca and Vertebrata); in the latter group the insect-parasites are dealt with in 17 pages. These exposés of the various groups of parasites are excellent; clear and concise, they obviate wading through voluminous handbooks in order to obtain or revive an insight in the parasites not acquainted with; a general parasitologist or zoologist will find this part of the book most useful as a recapitulation. The second part of the work is of general interest and deals with parasitism in general, infectious disease, distribution of parasites, control of parasites and parasitic diseases, host-specificity and evolution of parasites. It is very laudable that these fascinating chapters are dealt with from a biological point of view, and not—as has been the usual practice in the past—from a more anthropocentric one; really, this part is of absorbing interest. A bibliography with short annotations of most of the titles, a classification of parasites and a glossary/index complete the book. The 152 simple line-drawings which illustrate the work, although numbered, are not referred to in the text; the various diagrams of life-cycles are most instructive and comprehensible. We are greatly indebted to Professor Cameron for this important publication, which is based on his 30-years experience of teaching parasitology.

F. G. A. M. Smit.

SOME RECORDS OF WATER-BUGS IN SCOTLAND

By T. T. MACAN

(Freshwater Biological Association, Ferry House, Far Sawrey, Ambleside, Westmorland.)

The collections were made during the course of a tour through Ross and Cromarty (RW), Sutherland (NS) and Caithness (CA) in May, 1952, and during the Ecological Society's summer meeting at Aberdeen (AS) in July, 1955. Some justification for putting them on record seems needed in view of the amount of space in entomological journals allowed to collectors of water-bugs in the last few decades. That records from Scotland are not broken down into vice-counties in Bedwell & Massee's (1945, and Massee 1946 and 1955) distribution list seems one good reason. A second is that information was gathered about some species of whose ecological requirements not much is known; though it must be stressed that conclusions drawn during a quick tour, when there is no opportunity to return to seek confirmation of an idea that takes shape on the way, must be somewhat, if not highly, speculative.

A number of small bodies of water harboured the species which the writer at least would expect to find in them (Macan, 1954) and the captures are listed only on account of the vice-county record. With them are included some larger places in which only a few specimens were taken. Such records are:

Velia caprai Tamanini: stream Handa I. NS; stream Ben Lawers PM.

Gerris costae (Herrich-Schaeffer): peat cutting RW; stream Handa I. NS.

G. lacustris (L.): pool in stream RW; ornamental pond RW; peat pool NS.

G. odontogaster (Zetterstedt): peat cutting RW.

Corixa punctata (Illiger): pond CA.

C. sahlbergi (Fieber): peat cutting RW.

C. distincta (Fieber): sandstone pool RW; peat cutting RW; pond CA.

C. germari (Fieber): Loch of Easter Head CA.

C. carinata (*Sahlberg*): Loch of Easter Head CA.

C. nigrolineata (Fieber): peat cutting RW; rock pool Handa I. NS; peat pools on mountain AS.

C. venusta (Douglas and Scott): outflow of L. Loyal NS.

C. scotti (Fieber): sandstone pool RW; pool RW; pool in stream RW; peat pool NS.

C. praeusta (Fieber): pond CA.

C. wollastoni (Douglas and Scott): peat cutting RW; L. Lanlish NS.

Glaenocorisa propinqua (Fieber): rock pool RW.
Cymatia bonsdorffi (Sahlberg): pool RW.
Notonecta obliqua Gallen: peat pool NS.
N. glauca L.: pond CA.

Captures made in various moderate-sized bodies of water are set out in Table 1, in which the figures show the number of specimens caught by means of a pond-net not used in such a way as to indicate the relative densities of the populations.

Loch of Skene was oval, about one mile long and half a mile across, and remarkably shallow, being only about 30 cm. deep 30-40 m. from the water's edge. The bottom was of sand which left no organic débris behind when it was sieved, and the area of the lake obviously fluctuated considerably according to the rainfall. Both of the places on Forvie Sands were depressions in the slacks between sand-dunes. The maximum depth of the larger was about 30 cm., that of the smaller about 10 cm. Long Loch and the loch on Handa Island were comparatively small and both had a rather uniform shallow depth, as far as could be made out. Samples from neither were analysed, but the Loch of Easter Head, beside Long Loch on Dunnet Head, had a water that was soft, with only 4.6 mg./1. Ca, but somewhat brackish, with 109 mg./1. chloride, doubtless because it is near the sea. Lochs Heilin and St. John are shallow pans on the Old Red Sandstone. Loch Aigeil is dammed by blown sand. Loch Chruaidhlinn, situated just above the sea, is a very shallow piece of water fed by two fair-sized streams and polluted slightly by cattle and by sewage. Loch Caladail lies completely and Loch Borralan partly on the Durness limestone, and both are basin-shaped depressions.

Lochs Chruaidhlinn and Heilin were floored with mud, but the bottoms of all the rest at the places where the collections were made were of stones, gravel, sand or a mixture of all three.

The places have been arranged in Table 1 so that they fall into groups according to the species present. *C. germari* is common to all in the first group which can be subdivided according to whether *C. praeusta* is abundant or not. The second may be called the *scotti-dorsalis* and the third the *venusta* group.

Before making further comment on these findings, I offer a few words about what is already known, basing them on my own experience and the numerous records published or sent to me unpublished by Drs. Brown, Popham, Slack and Walton (Macan, 1954). *C. concinna*, one of the rarer British species, may be associated with a salt content higher than usual and is a species of exposed shores. Walton (1943) records it in Blagdon Reservoir with *C. germari*. *C. praeusta* is associated with pollution in moderate-sized bodies of water. *C. germari* is a somewhat puzzling species; it occurs on the one hand in large calcareous lakes such as Lough Neagh and some others in

Ireland (Macan and Lund, 1954), and in Blagdon Reservoir (Walton, 1943), on the other in moorland ponds some of which are very poor in lime. A rather uniform depth is characteristic of the latter. Walton (1943, p. 255) writes that it 'probably lives in deeper water than any other species except possibly *C. panzeri*. At Blagdon Reservoir it was very numerous in water at least one metre deep, if not deeper, and could also be found abundantly in rough water. *C. dorsalis*, known until recently as *C. striata* and misnamed *C. lacustris* for a short period, is typical of sandy and other bottoms with little organic matter, and occurs together with *C. scotti* in poorer waters (Macan, 1955). *C. venusta* is often found in moving water, in quarry pools and in high pools. Macan (1954) records finding it on a delta in a Scottish lochan, and speculates whether it was near an inflow when recorded in ponds and lochans by other people.

Since there was a hard bottom with little organic matter at most of the collecting places, the interest of the present catches centres round the relationships of the species typical of this kind of substratum.

The occurrence of *C. praeusta* in the two places at Forvie Sands was to be expected, because both were fouled by gulls; pollution at Loch Skene was not evident, but the place may have been frequented by birds. The occurrence of *C. concinna* also fits in with what is already known about it, because both places where it was found had a higher salinity than is usual for freshwater; so, however, had most of the other places. *C. germari* was taken seven times, two more than any other species, which is unusual. Long Loch and the loch on Handa Island, the two places which in section were like a pill-box hat, rather than like a British Army tin hat as most lakes are, were typical haunts of this species. It might also have been expected to occur in the Old Red Sandstone lochs, as indeed it did, though why it should have been the most abundant species in Loch Heilin and the scarcest in St. John's Loch is inexplicable at present. Loch Skene with its gently sloping floor might at first seem a typical haunt of *C. dorsalis*, but I do not think that it was for two reasons: first, there was probably too much wave action at the margins, and secondly, the margins advanced and receded too rapidly. Any corixid colonizing the place would have to be, I believe, a species capable of living in the deeper water some distance from the edge. The occurrence of *C. germari* confirms the idea that it is such a species. Possibly *C. concinna*, associated with *C. germari* in Blagdon Reservoir, is another. The two places on Forvie Sands were shallower than those inhabited by *C. germari* generally are, but it was not plentiful in either of them.

It is possible that the frequency of *C. germari* in these collections is not solely a matter of suitable physiographical or other local conditions, but that the climate, being more favourable than in the south, enables it to inhabit a wider range of places. Little is known about

TABLE 1. CAPTURES OF CORIXIDS

Loch	Vice-county	pH	* Ca	* Cl	*C. venusta* (Douglas & Scott)	*C. dorsalis* Leach	*C. distincta* (Fieber)	*C. scotti* (Fieber)	*C. germari* (Fieber)	*C. praeusta* (Fieber)	*C. concinna* (Fieber)	*C. wollastoni* (Douglas & Scott)	*C. propinqua* (Fieber)	*C. nigrolineata* (Fieber)	Others
Skene	AS	7.5	18.3	21.9	—	—	—	—	41	16	12	—	—	—	—
Forvie Sands 1	AS	—	—	—	—	—	10	—	6	35	5	—	—	11	*sem.* 6, *lat.* 3, *sahl.* 3
Forvie Sands 2	AS	—	4.3	64.3	—	—	—	—	4	44	—	—	—	—	*sahl.* 2
Handa I.	NS	—	—	—	—	—	—	4	11	—	—	3	5	—	—
Long	CA	—	—	—	—	—	1	—	7	—	—	9	—	—	—
Heilin	CA	7.3	43.4	44	—	—	5	—	10	1	—	—	—	—	—
St. John	CA	7.3	21.6	63	—	2	10	14	1	4	—	—	—	—	*cast.* 1
Caladail	NS	7.7	29.8	38	—	13	5	15	—	—	—	—	—	—	—
Aigeil	NS	7.5	26.0	52	—	23	—	20	—	—	—	—	—	—	—
Chruaidhlinn	NS	—	—	—	18	6	—	—	—	—	—	—	—	—	—
Borralan	NS	7.2	9.8	13	22	—	—	—	—	—	—	—	—	—	—
		Times recorded			2	4	5	4	7	5	2	2	1	1	

sem = *C. semistriata* (Fieber)
lat = *C. lateralis* (Leach)
sahl = *C. sahlbergi* (Fieber)
cast = *C. castanea* (Thomson)

* Milligrams per litre.

its world distribution because it was confused with *C. carinata* for so long.

Of the three lochs in the next group, St. John's has been discussed already. In the other two, Caladail and Aigeil, *C. germari* is absent, and *C. dorsalis* and *C. scotti* plentiful. Possibly this is because both are 'tin-hat' rather than 'pill-box' lakes; that is, the bottom slopes from the edge fairly steadily into deep water. The suggestion is put forward that *C. dorsalis,* and *C. scotti* with it in poor waters, are typical of shallow water and sandy and gravelly bottoms where there is some shelter, whereas *C. germari* occurs further out and is generally confined to places where there is a fairly extensive area of water about one metre deep; but this suggestion requires confirmation from a more detailed study of contours than has yet been made.

Finally, why did *C. venusta* occur on the substratum of gravel with some stones and sand in L. Forralan, instead of *C. dorsalis* and *C. scotti,* which might have been expected on the gently shoaling bottom? No answer is offered. The place was a bay without any inflow, and therefore there was no question of there being a current. Possibly Walton's (1942, p. 444) observation that *C. venusta* is encountered more frequently in the north than in the south has a bearing on the problem.

L. Caladail is worth further notice because, though it is calcareous, its corixid fauna is that of a poor lake (Macan, 1955). So was the snail fauna, for we took only *Limnaea pereger.*

To conclude, some comments on absence are put forward, though with caution, for absence is difficult to establish even when time is available for the most thorough collecting. We did not take *C. falleni,* though the Caithness lochs appeared suitable for it. Walton (1942) records one specimen from the Hebrides and lists it among the species that are commoner in the south than in the north. It is numerous in Loch Leven (Macan, 1954, p. 137). Nor were any of the brackish water species taken, although, since we were near the sea for much of the time, we collected in many places with a high salinity. Three specimens of *C. lateralis,* often found in brackish or polluted places, were taken in the smaller of the two Forvie dune-ponds, which was both.

The first collections were made in collaboration with Mr. H. C. Gilson, the second with Dr. H. B. N. Hynes. My thanks are due also to Mr. F. J. H. Mackereth and to Mr. J. Heron, who made the analyses shown in Table 1 and many others as well. Dr. J. W. G. Lund has extensive unpublished data about the phytoplankton of the lochs visited.

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THE SOCIETY FOR THE BIBLIOGRAPHY OF NATURAL HISTORY

The Society was founded on 14th March, 1936, at a meeting of interested botanists, zoologists, librarians and bibliographers who had assembled in the rooms of the Royal Entomological Society of London.

This meeting followed a number of informal conversations between the late Dr. C. Davies Sherborn, Mr. Francis Hemming and Mr. Francis J. Griffin, all three well-known in the field of natural history bibliography and nomenclature. Dr. Sherborn, the compiler of the tremendous 'Index Animalium', the fruit of a lifetime's searching into zoological literature, became the first President of the Society, and was a frequent contributor to its 'Journal'.

The Society was founded for the study of the bibliography of all branches of natural history, and its 'Journal' is the organ by which it seeks to promote that study in the widest possible sense.

The 'Journal' contains published lists of bibliographical papers published in various scientific journals, original contributions on the dates of publication of works on natural history, biographical articles, notes on rare books, occasional reviews of bibliographical publications, and the like.

From time to time, facsimiles of rare articles or pamphlets have been published in the 'Journal', as for example Hübner's 'Lepidopterologische Zuträge' (1820), published in the 'Journal' in 1938, and, in 1940, R. H. Beddome's articles on Indian Reptiles (1826-1870), which up to that time had only been available in a rare medical journal published in Madras, and in which new species were described.

Biographical notes on deceased naturalists, usually accompanied by a list of their writings, have been a useful feature, and such major bibliographies as Travis Jenkins's 'Bibliography of Whaling' (1948), and that of Francis Griffin on the Isoptera (1951), are still in demand.

Among recent articles of interest to entomologists may be cited the interesting contribution by R. Homberg on some unknown plates in Ernst and Engramelle's 'Papillons d'Europe', and the study by Gaskin and Lewis of Bonelli's 'Tabula Synoptica', accompanied by a photographic reproduction of the 'Tabula'.

There certainly appears to be room amid the crowd of specialist journals for a periodical which deals specifically with the bio-bibliographical aspect of natural history, and biological systematists in particular should be interested in those articles in the Society's 'Journal' which treat of the dates of publication of various key-works in natural history in view of the paramount importance of these dates in connexion with the rules of biological and zoological nomenclature.

Membership of the Society is on a personal basis and the annual subscription, payable on February 1 of each year, is one guinea (£1 1s.). Members receive all parts of the 'Journal' without further payment.

Hitherto it has not been financially possible to issue more than one or two parts of the 'Journal' during the year, but as interest in the Society's activities is by no means lacking, it is hoped gradually to undertake further enterprises such as facsimile reproductions of rare articles or pamphlets, and original works on special aspects of the bibliography of natural history.

The Honorary Secretary and Treasurer of the Society is Mr. A. C. Townsend, c/o British Museum (Natural History), Cromwell Road, London, S.W.7, to whom requests for further information, or applications to join the Society should be addressed.

E. W. C.

PYRAUSTA PERLUCIDALIS (HÜBNER) IN WOOD WALTON FEN (LEP: PYRALIDIDAE)

It appears that *P. perlucidalis* is undoubtedly breeding in Wood Walton Fen, Hunts. The area was worked with mercury vapour lamps from portable generators on several nights during the second half of June, 1957, by Messrs. H. G. Huggins, J. D. Bradley, E. C. Pelham-Clinton and myself, the party being joined for part of the time by Mr. D. More. In spite of unfavourable weather five males were taken, four at light and one flying along the side of a ride.

Mill House,
Chiddingfold,
Surrey.

ROBIN M. MERE.

DICTYOPTERA ON FLOWER HEADS

Whilst collecting at Hurn, Hants, on 21st July, 1957, I was surprised to find numerous larvae and imagines of *Ectobius panzeri* Steph., feeding on the flowers of Ragwort (*Senecio jacobaea* L.). A single male *E. pallidus* (Olivier) was also present. The afternoon was warm and sunny after a slight shower of rain.

29 Glenfield Road,
Banstead, Surrey.

A. E. GARDNER.

IT HAPPENED AT . . . .

Prelude

The Kennet Valley in Berkshire is a delectable collecting ground, especially if one is lucky enough to possess portable mercury vapour equipment. Such equipment was to hand, but transport was the problem. A 350 cc. motor cycle was fitted with a stout table which carried the generator—panniers accommodated choke, flex, lamp tripod, rubber tubing and voluminous sheets—the driver sat on the apology for a seat that still remained in sight. After several night operations hauling this load to and forth it was decided to hide the gear in the reed beds, as this locality was worth visiting many times throughout the summer.

My colleague from N . . . knew the owner of the land, and with the added precaution of fully labelling all articles . . . . c/o a certain provincial museum, we thought all was set fair.

The system worked wonderfully—all we had to do was pull Moses from out of the bullrushes, run the cable to the tripod, wind her round, and we were away. No more freighting in the early hours —no more gyrations down the Bath Road—it was some 'system'.

Act I

An unexpected happening prevented me from visiting the locality for about 10 days, during which time Moses was discovered, and his discovery led us into deeper water. We hadn't bargained that the landowner might sub-let to another farmer, or that the said tenant's man on tidying up the reed bed with his scythe would cut away all the carefully arranged camouflage.

The news went round the village that some sort of special equipment, wires and things, had been discovered hidden in old so-and-so's reed bed. The locals chewed it over—Harwell was due north, Aldermaston just to the south—perhaps the stuff was radioactive. But the labels said . . . . museum (?). That was it! Stolen from the museum, dumped in the reeds until nightfall, then probably the gang would pick it up in a lorry. The police had to be notified at once—the telephone wires buzzed down the Kennet Valley—a field conference took place—the spot was examined for possible clues—and at dusk two worthy members of the force prepared for an all-night vigil ready to pounce out from the reeds on to the thieves (or even spies) and catch them red-handed.

One can imagine the enthusiasm that these two brought to their task—the nearness of *chryson* would have gone unheeded—the dawn flight would be unappreciated. The prize was to be their equivalent of a *Daphnis nerii*.

Yet with the temperature never below 68, with plenty of cloud cover and no moon—they drew a complete blank. For them it was not a good night.

Act II

Ten days later. Apologies to police officials of N . . . for unintentional red herring—apologies to tenant of land (who saw the funny side of it), and apologies to Moses discoverer.

I'm sure the villagers were rather disappointed when the truth was known, for as one of them confided to me later: 'You know, sir, it was some excitement while it lasted'!

B. R. BAKER.

UNUSUAL FLIGHT-TIME OF *LASIUS FLAVUS* (F.) (HYM: FORMICIDAE)

On 20th May, 1957, I found an alated female of *Lasius flavus* (F.) in my garden in East Sussex, about to remove her wings after the nuptial flight, preparatory to finding a suitable hole in the ground for the foundation of a new colony. The time was one o'clock in the afternoon. I have never found alated females of this species as early as May in this country until now. Donisthorpe (Hymenopterist's Handbook, *Amat. Ent. Soc.*, page 48, 1945) gives July as the earliest month for flight of *L. flavus*; Stitz (*Die Tierwelt Deutschlands*: Ameisen oder Formicidae, Jena, 1939) gives July and August, but quotes Schenck to the effect that the marriage flight can take place as early as June (and be prolonged until September and October); Forel (Die Ameisen der Schweiz, Duebendorf, 1915) gives the end of June as the earliest date for *L. flavus* in Switzerland.

It may also be noted that the conditions were not those normally associated with the nuptial habits of this ant. The day was overcast, with a fairly strong south-west wind blowing, and a temperature of about 54 deg. F.

A random sampling of a few *L. flavus* nests in the vicinity revealed what was expected, namely, that there were eggs and larvae in abundance, but no males or virgin females.

The most probable explanation is, as Mr. C. A. Collingwood has suggested, that this alated female was too immature at the time of the flight from the nest last summer or autumn, and remained in the nest throughout the winter. As a rule, *L. flavus* will not tolerate left-over females after the flight of the sexes, killing these females rather than readmitting them to the colony, but this specimen would seem to have escaped this fate.

A. N. BRANGHAM.

PARASCOTIA FULIGINARIA (L.) IN MIDDLESEX (LEP: PLUSIIDAE)

A specimen of *P. fuliginaria* was taken by Mr. M. Britton at mercury vapour light in Ruislip on 10th August, 1956. The specimen was rather worn.

W. E. MINNION.

ENTOMOLOGIST'S GAZETTE

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